MOTOR AGE

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Vol. XXX November 2, 1916 No. 18

Contents

TRUCK INDUSTRY HAS YEAR OF EXPANSION..... 5
GREATER CAPACITY RANGE FOR 1917 TRUCKS..... 15
Makers offer more sizes of commercial vehicles and several add electric lighting and starting
EDITORIAL—PAINTING A TRUCK CANVAS..... 18
Our school of design
AITKEN SETS 100-MILE RECORD..... 20
Takes honors in Harkness trophy meet at New York, driving 105.95 m. p. h.
TO DECOY GAS FRAUDS..... 24
Chicago fender ordinance may become effective January 1
PACKARD BUILDS RAPIDLY..... 25
6.6 acres of floor space added during year
ADVOCATES STANDARDIZING COMMITTEE FOR TRAFFIC..... 30
WINTER AND THE SIDE CURTAINS..... 32
TRUCK BULLS-EYES..... 33
High spots in commercial car development
SPECIFICATIONS OF THE 1917 TRUCKS..... 41
Buyers' directory and other data
TRUCK ADAPTERS AS APPLIED TO FORDS..... 62
TRAILERS PLAY BIG PART IN HAULING..... 66
ELECTRICAL EQUIPMENT OF THE MOTOR CAR..... 68
PREST-O-LITE AIR BRAKE ILLUSTRATED AND DESCRIBED..... 76

DEPARTMENTS

From the Woman's Viewpoint. 70
Readers' Clearing House..... 72
Motor Car Repair Shop..... 75
Accessory Corner..... 78
From the Four Winds..... 81
Among the Makers and Dealers 82

ANNOUNCEMENTS

Engines for the 1917 cars, which will be a feature article of Motor Age, issue of November 9, will treat the current and new designs of stock motors from the car owner's viewpoint. The story of engine progress throughout the year is one from which car owners will derive much benefit. Also, New Orleans from the tourist's viewpoint.

OPPORTUNITY for men in other lines of business TO BECOME TRUCK DEALERS

The last few years have seen great numbers of merchants from less active and less profitable lines of business enter the pleasure car field in one capacity or another. There has been a reaching out for an opportunity to bring their talents into play in a larger, more productive sphere of operations.

Today the exodus of capital and business ability is starting with impetus in the direction of the truck industry, the industry which is more than likely to register the next important commercial success of the century.

Motorized delivery service is surely coming into its own. Its possibilities are just being scratched. Its opportunities are fresh—its promise of future reward attractive.

Anyone interested in the possibilities of the commercial car industry from the standpoint of entering it actively as dealer or distributor will find the advertising pages of this issue of MOTOR AGE helpful at arriving at a definite decision. Read these advertisements carefully. Answer them. Information of more than usual interest may result.

MOTOR AGE
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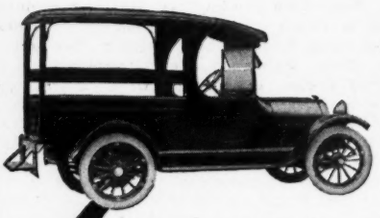
STUDEBAKER

Commercial Cars



This Station Wagon at $875 is another example of the opportunities that a Studebaker Dealer of Commercial Cars has before him. It is just ONE of SIX cars that Studebaker produces.

It is the ideal "carry-all" for any business in which men as well as goods must be transported. It appeals especially to hotels as a station 'bus for both baggage and passengers. It carries 10 passengers in comfort and with the seats folded up, it makes an ideal express and baggage car.

To the man who wants to BUILD a lasting business, no industry offers a better chance than the commercial car line. The market is widening day by day. Not one-half of 1% of the possibilities have been touched.

We urge every energetic man to write at once for full information on the opportunity a Studebaker Dealership offers him.

	HALF-TON CARS	
1.	Panel Delivery Car -	$ 875
2.	Express Car - - -	850
3.	Station Wagon - -	875
	ONE-TON CARS	
4.	Open Express - - -	1200
5.	Stake Body - - - -	1250
6.	Bus, 16-passenger - -	1400

F.O.B. Detroit

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Detroit, Mich.

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MOTOR AGE

Truck Industry Has Year of Expansion

By Darwin S. Hatch

Commercial Vehicles in Unprecedented Growth

ANNO DOMINI 1916 has above everything else in the commercial vehicle field, been a year of expansion. This expansion has been shown in greatly increased production and increased factory capacity, in greater efficiency of manufacture, in improvement in distribution facilities, and in the greater range of models of different capacities, which are offered.

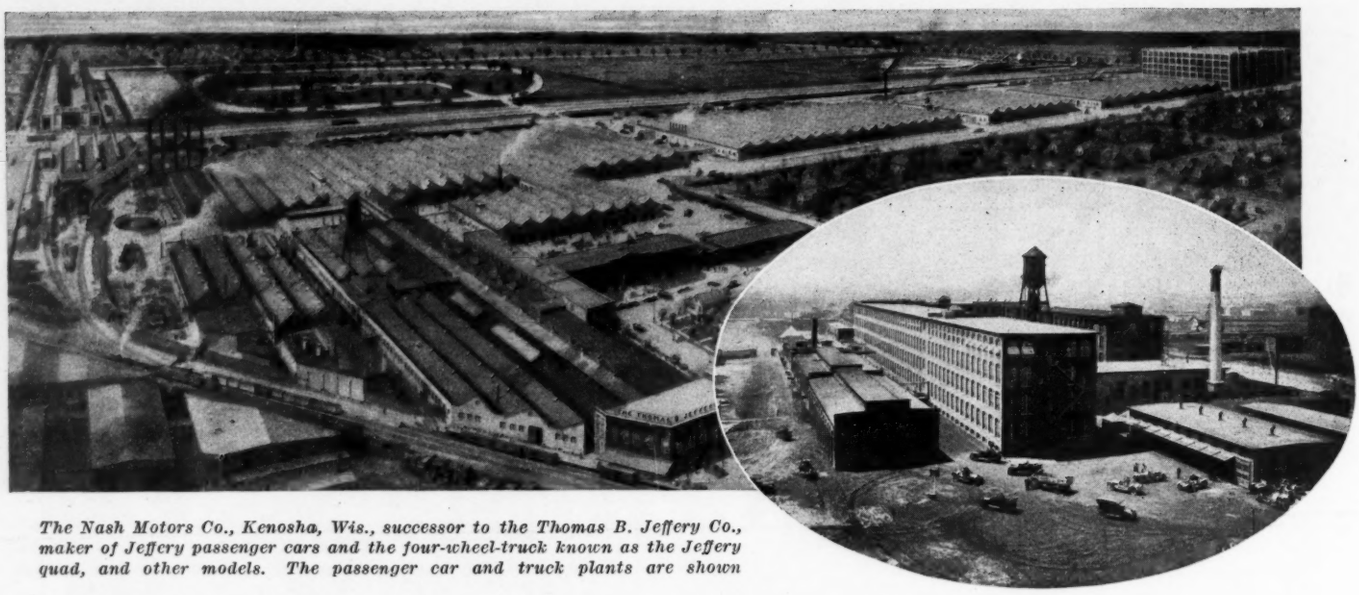
More than this, it has been a year of foresight whereby truck manufacturers have been planning for the future to a greater extent than ever before. Along with their increase in output and factory capacity, the commercial vehicle builders have been taking into consideration the need for still more greatly increased production in the future and, at the same time, have planned for the economy which will be made necessary by the keener competition of later years.

It is from the standpoint of production that the greatest expansion of the year is in evidence. Motor truck manufacturers by the end of 1916 will have built over 98,000 commercial vehicles. This is one-third greater than the production during 1915 and almost three times that of 1914. To give an idea of the growth of production during the history of the truck industry the number of cars built each year for a period of 8 years are given herewith:

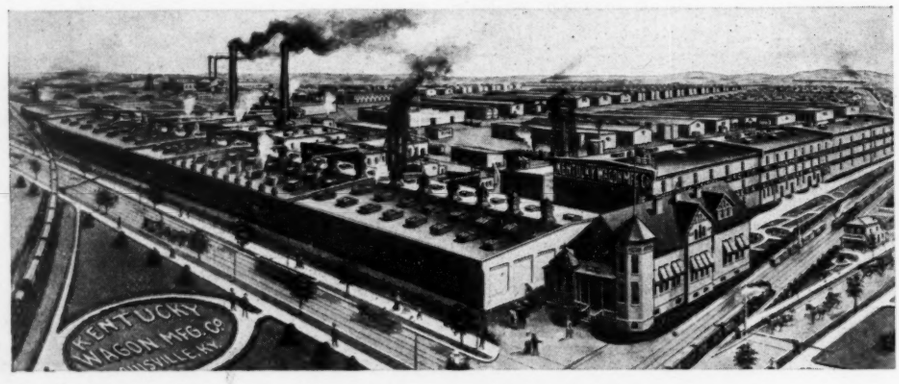
1916	98,000	1912	25,000
1915	74,000	1911	17,000
1914	35,000	1910	9,000
1913	28,000	1909	5,500

These figures of annual production are the results of very careful canvassing through the industry each year by Motor Age, and the report for 1916 is based on the returns from 185 manufacturers of motor-driven commercial vehicles in America. Most of these are by personal visits of special representatives of Motor Age. These 185 manufacturers have reported a total of 97,647 trucks turned out from their factories during either the calendar year of 1916 to date or during recently entered fiscal years, which vary with the different concerns.

Some of the smallest companies from whom reports were not received will add to this figure, as will also the production between this date and the end of the year, which in some cases is not included in the figure; consequently, it is safe to assume the total will be very close to the 98,000

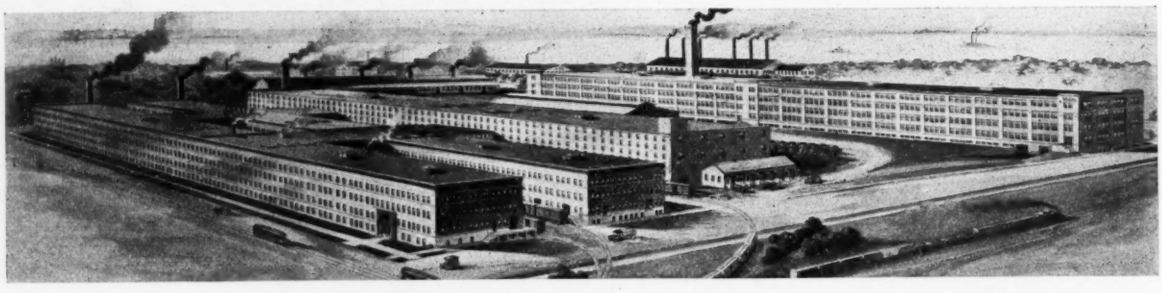


The Nash Motors Co., Kenosha, Wis., successor to the Thomas B. Jeffery Co., maker of Jeffery passenger cars and the four-wheel-truck known as the Jeffery quad, and other models. The passenger car and truck plants are shown

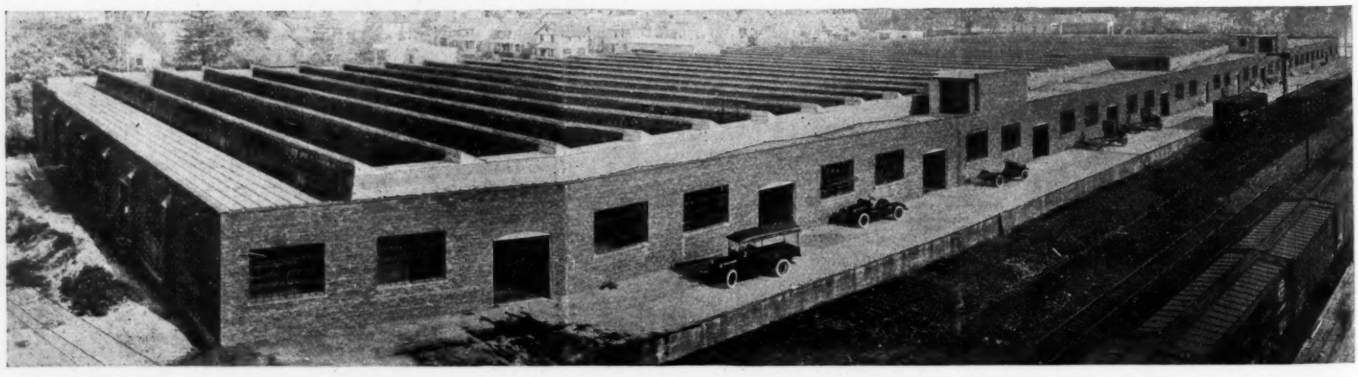


Oval—The long low building at the left is where the Locomobile Co. of America, Bridgeport, Conn., assembles its trucks. Some space in the other buildings is used for making truck parts

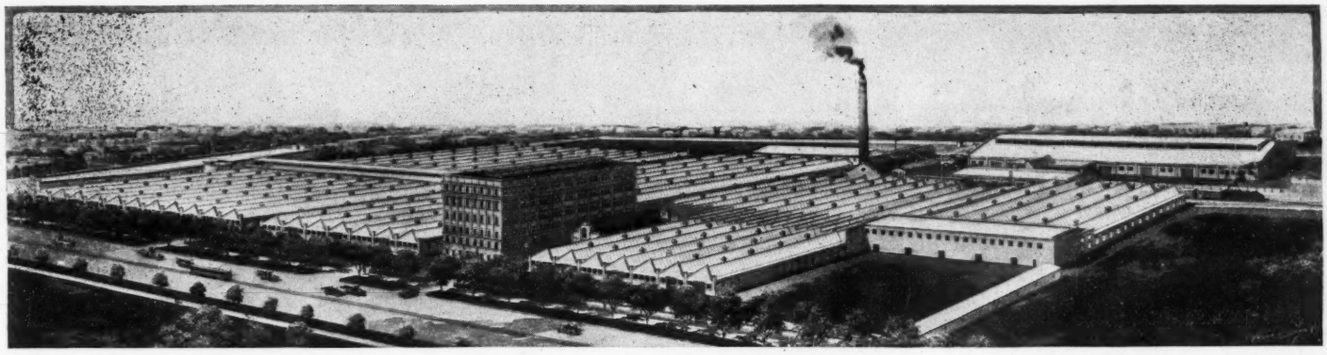
Left—Plant of the Kentucky Wagon Mfg. Co., Louisville, Ky., where Old Hickory trucks are made



Plant of the Velie Motor Vehicle Co., Moline, Ill., where both passenger cars and trucks are made



The Reo Motor Car Co., Lansing, Mich., which makes both cars and trucks, but has the two lines of manufacture separated, has added 4½ acres of floor space to its truck factory in the last year, which increases the capacity 25 to 30 per cent



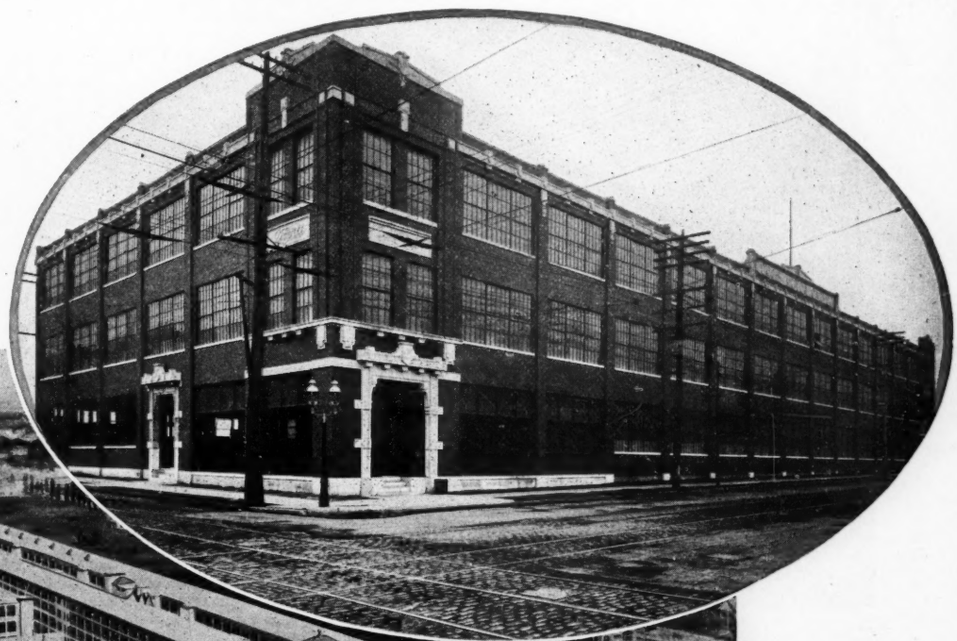
The White Co., Cleveland, O., is making extensive additions, consisting of a new wing to take the place of open tents in which some of the factory operations and most of the storage have been taken care of in the last year. This view shows the entire plant, only a portion of which is devoted to the manufacture of trucks, but there is no way of indicating just what parts are used for truck production

given above. Of this figure 635 trucks are electric and 50 are steam, the remainder being gasoline vehicles.

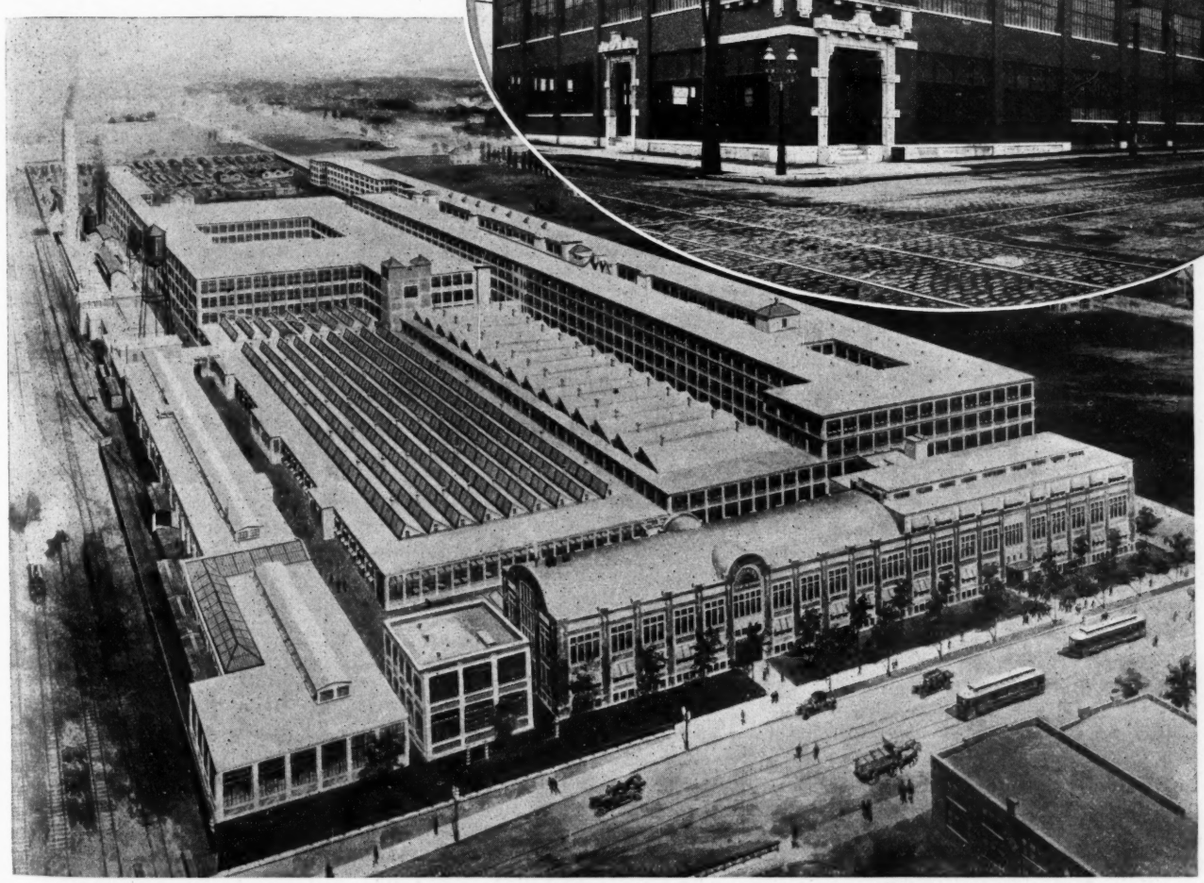
Analyzing the Industry

If we analyze the truck industry, and particularly the truck sales, as to the sizes of the commercial vehicles, we find that approximately one-half of them have been vehicles of a capacity of 1,500 pounds or less; one-quarter of them have been 1 ton, 1½-ton or 2-ton trucks; 20 per cent have been 3 or 3½-ton vehicles, and only 5 per cent have been designed for carrying loads of 5 tons or over.

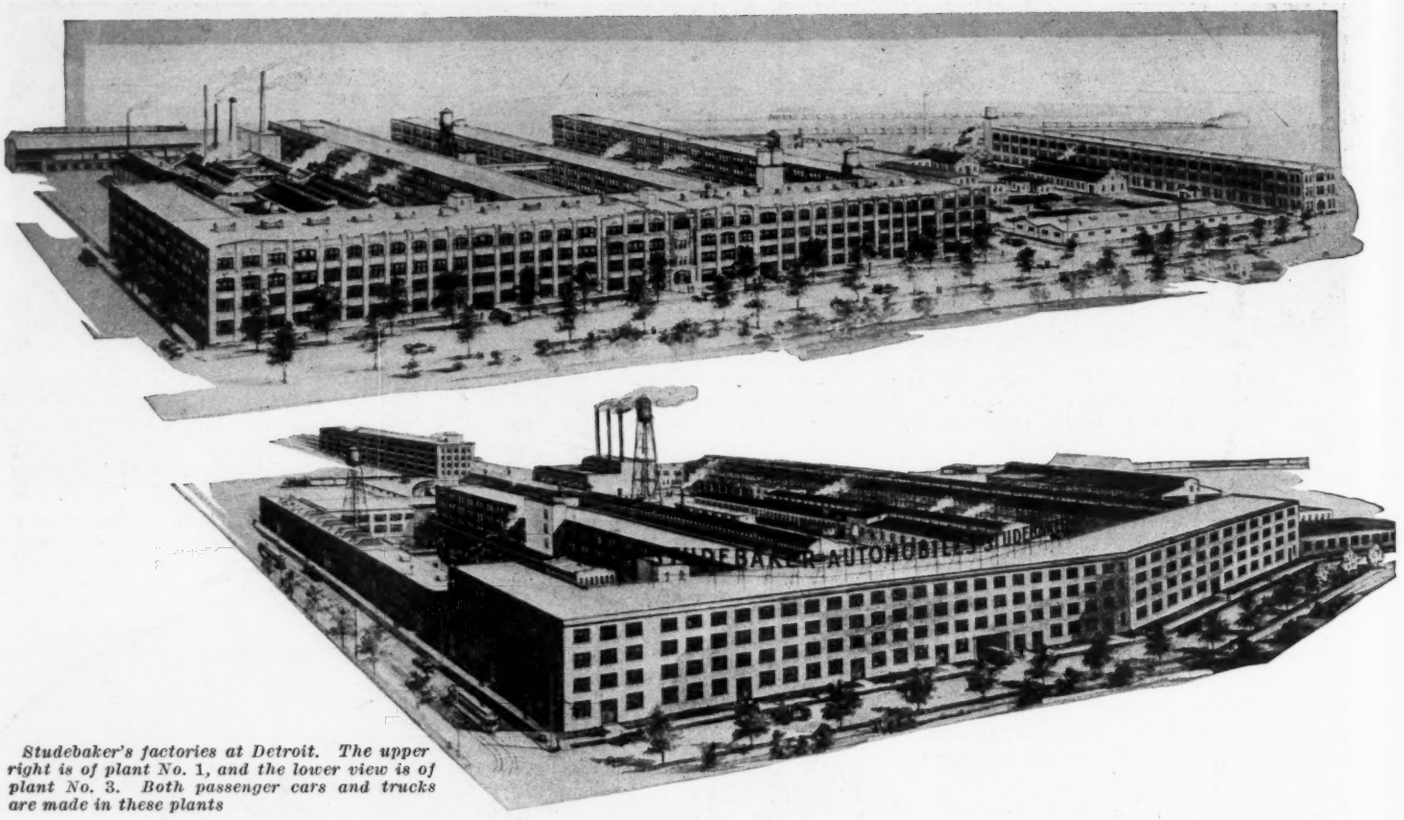
There is a hopeful sound in these figures, for it means that the motor vehicle is growing more into the field which originally was thought the province of a horse-drawn



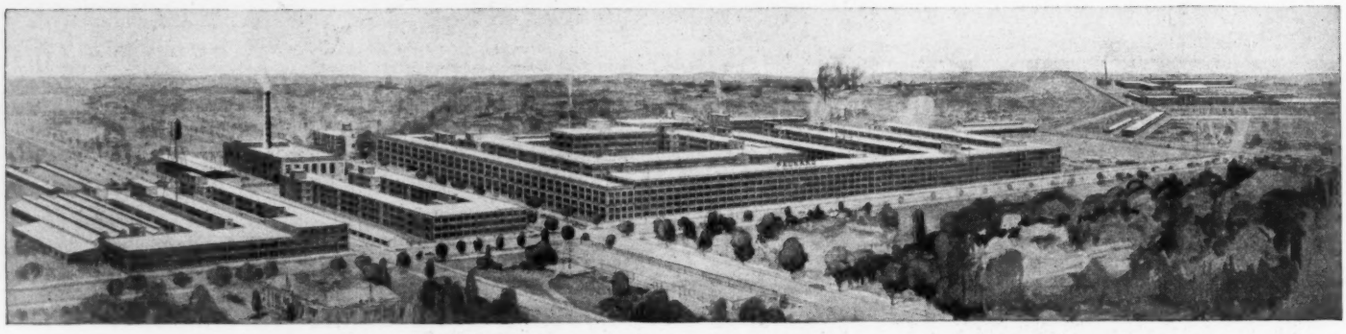
In oval—Plant of the Dorris Motor Car Co., St. Louis, Mo., a part of which is devoted to truck production and balance to motor cars



Immense plant of the Pierce-Arrow Motor Corp., Buffalo, N. Y., where both trucks and passenger cars are made. Additional space has been given to the truck end of the business in the last year, which has increased the capacity 10 per cent



Studebaker's factories at Detroit. The upper right is of plant No. 1, and the lower view is of plant No. 3. Both passenger cars and trucks are made in these plants



The buildings at the extreme left, that is at the street intersection, as well as those in the distance on the right are devoted to the manufacture of Packard trucks at Detroit, Mich. The remainder of the buildings are the passenger car plant

wagon, that is, the light delivery service. It also means that the motor truck in its lighter form is reaching a very large number of users. The field for the light delivery vehicle naturally is very much wider than that for the truck of greater capacity, because there are more concerns whose business can be benefited by them.

An Abnormal Factor

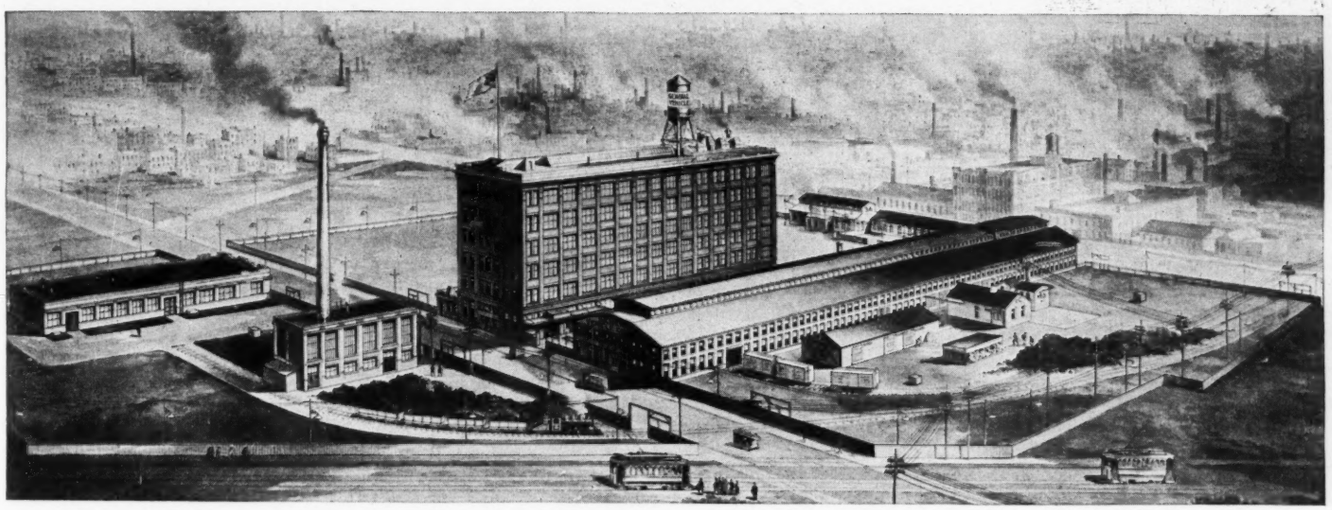
Naturally, when considering the commercial vehicle industry during the past year or two, there is one factor which is an abnormal one, a factor which has made business abnormal to a certain extent in a larger proportion of the industries of this country. This is the war business, so called. This has had a double effect, one of these being the opening of a highly specialized market for certain classes of trucks for use on the battle field, either as transportation mediums for troops, supplies and ammunitions or for the red cross service in conveying the wounded to hospitals. Also, another angle of the export business which may or may not be considered strictly war business is that of exports to the ammunition factories and other industries whose product goes to the front, for which American trucks have served as transportation facilities.

Of course, there has been a respectable percentage of the truck export during the past year which was directly dependent upon conditions of war in Europe for its existence, but the extent of this business has not been nearly so great as is generally believed, nor was it nearly so great in the past 12 months as it was during the first 6 months of the European conflict.

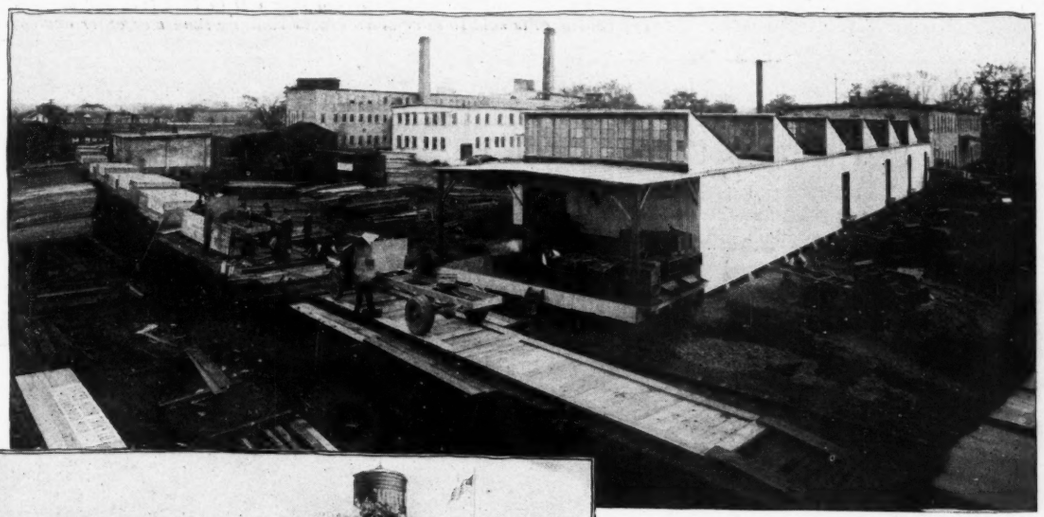
There are three reasons for this. One is the fact that the disorganization of industry of the countries at war at the opening of hostilities has been superseded by reorganizations which have enabled the belligerent countries to produce more nearly the full number of trucks demanded for their armies and ammunition factories. Another reason is that during the past year the United States government has called for commercial vehicles for its own war department, and the truck manufacturers have responded nobly. In many instances they have diverted foreign orders to Uncle Sam's own military needs. Another reason, perhaps a very potent one, is the astringency of the parts and materials marketed, which in itself is a manufacture of the war.

War Business Small

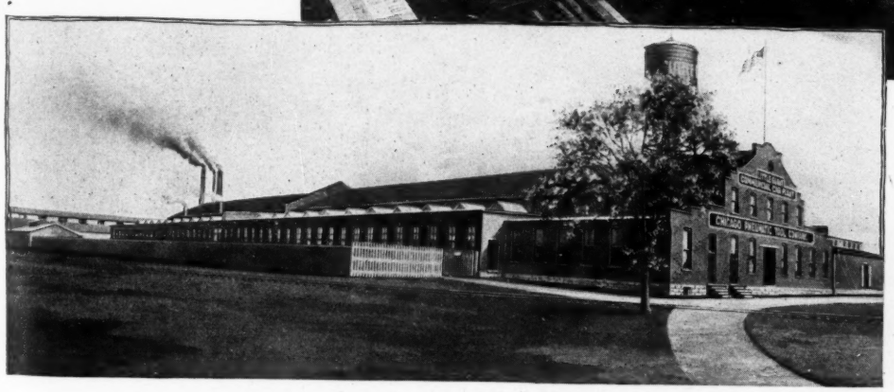
Taking all in all the purely European war business of American truck builders for 1916 has been comparatively small. But the export business as a whole has been comparatively large. One or two concerns have sent from a third to a half of their output to other countries. The bulk of this, however, has gone to countries not at war, though there has been a very substantial business with British posses-



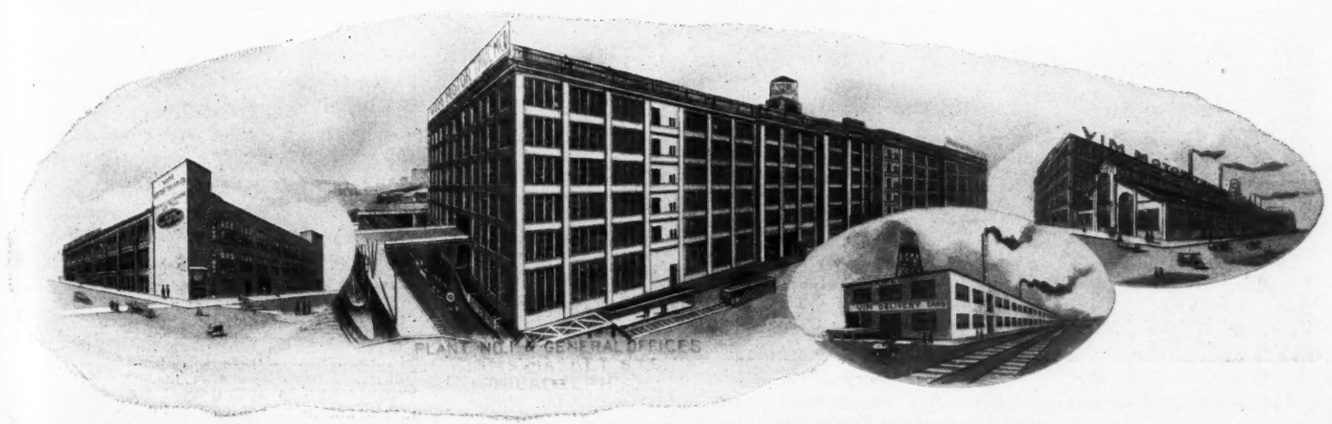
Above—Plant of the General Vehicle Co., Inc., Long Island City, N. Y.



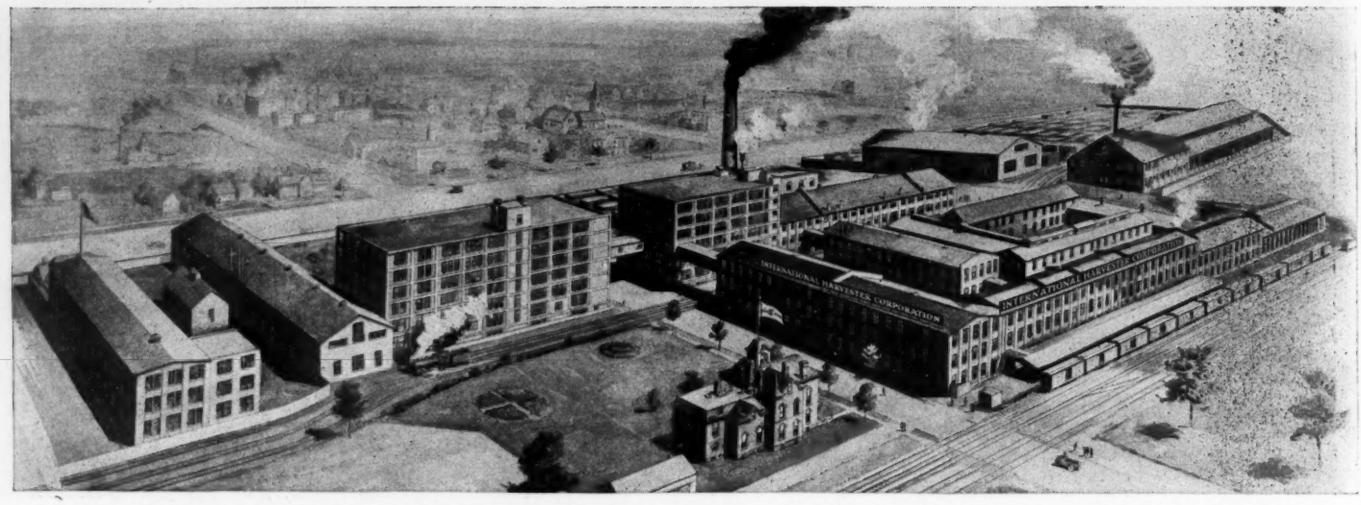
Right—United Motors Co., Grand Rapids, Mich., formerly the United Motor Truck Co., has been making additions in the last year



Motor truck plant of the Chicago Pneumatic Tool Co., Chicago Heights, Ill. This is the home of Little Giant trucks

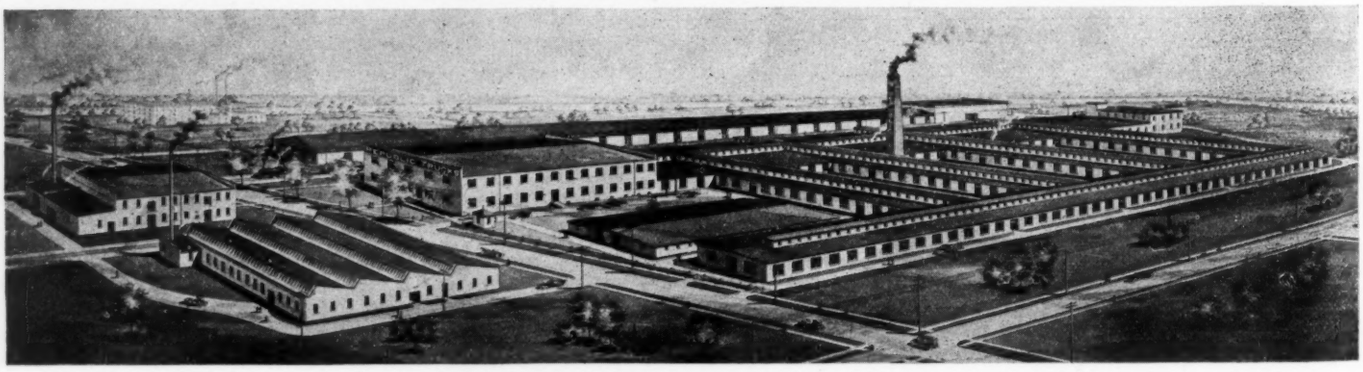


The Vim Motor Truck Co., Philadelphia, Pa., has four plants in Philadelphia and suburbs, all of which are shown above

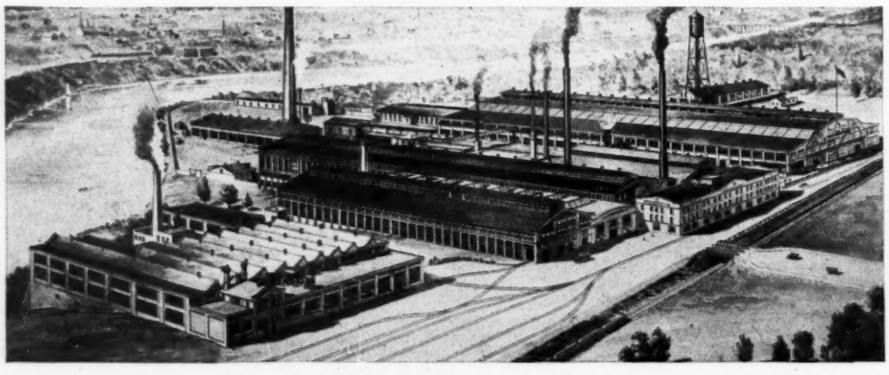


Factory capacity of the International Harvester Co., Akron, O., has been more than doubled within the last year, although the floor space has not been increased. This was made possible by adding sufficient floor space a year ago to take care for expansions of capacity during the last 12 months. The International is said to have more trucks running than any other one concern

The General Motor Truck Co., Pontiac, Mich., has made no additions to its plant in the last year, but has taken occupancy of much space in its plant not occupied previously. It is planned to build 7,000 trucks in this plant next year



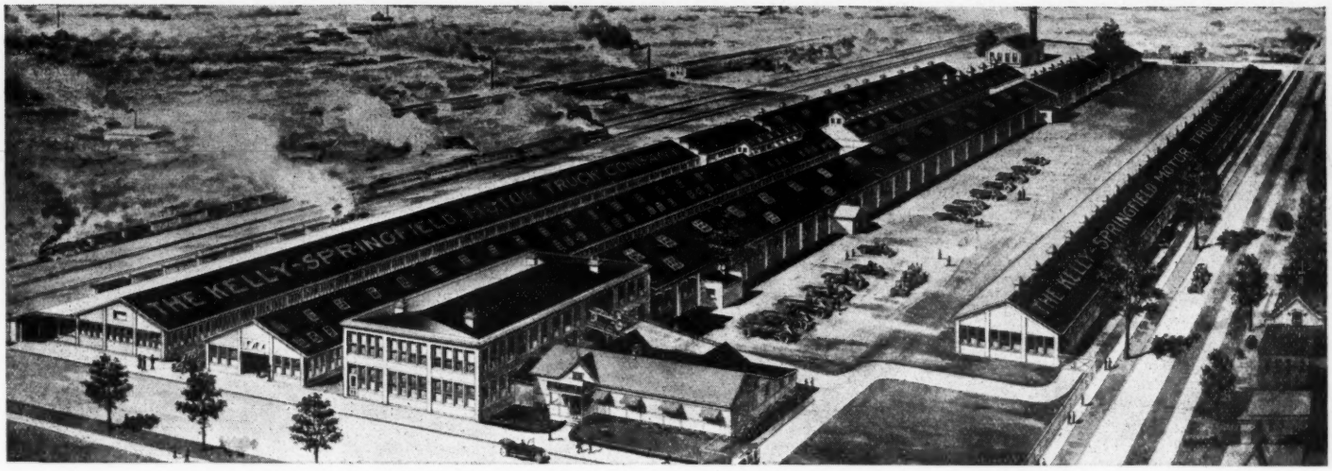
The Republic Motor Truck Co., Alma, Mich., has added to its plant frequently in the last 2 years. It is believed that by the first of the year, or at least by spring, Republic will be among the largest motor truck manufacturers in the world. Production schedules for 1917 include 20,000 to 22,000 trucks



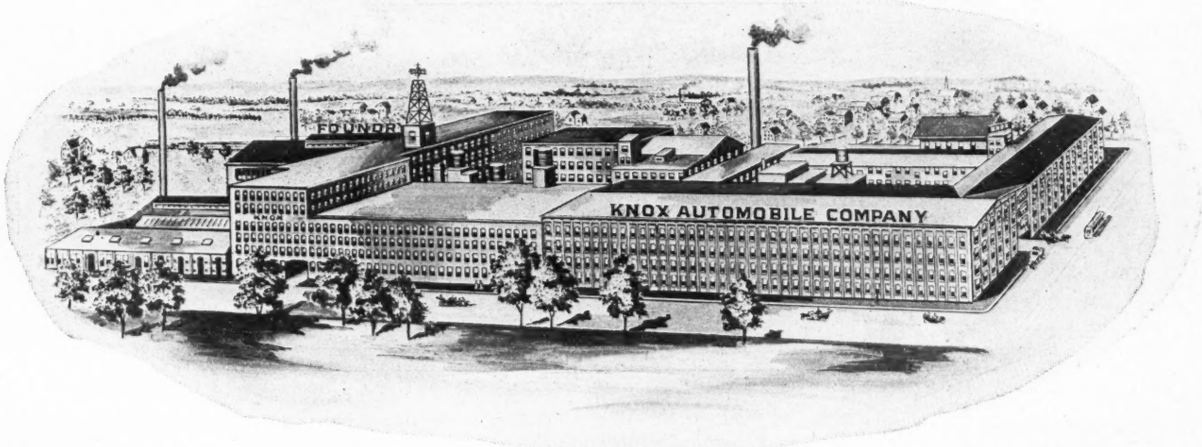
Plant of the Milwaukee Locomotive Mfg. Co., Milwaukee, Wis., which makes the Walter four-wheel-drive tractor

sions, such as Canada, Australia, Asia and so on. The total exports up to June 30 and including the 12 months previous was 21,265 trucks, approximately one-fourth of the total production. The trucks exported during that time reached a value of $56,805,548. For 1917 it is expected that there will be about 20,000 exported and 96,000 sold in this country, making an estimated total production for 1917 of 116,000 trucks.

Had it not been for the shortage in materials and parts which go into the commercial vehicle, it is almost certain that production figures for this year would be considerably greater than they are. Many manufacturers found it necessary to curtail their plans considerably through sheer



The Kelly-Springfield Motor Truck Co., Springfield, O., has doubled the capacity of its plant in the last 18 months. War orders have been responsible for much of this addition. Quantity production has done much to offset the high prices of materials in the Kelly plant in the last year



Plant of the Knox Motors Associates, Springfield, Mass., makers of Knox tractors

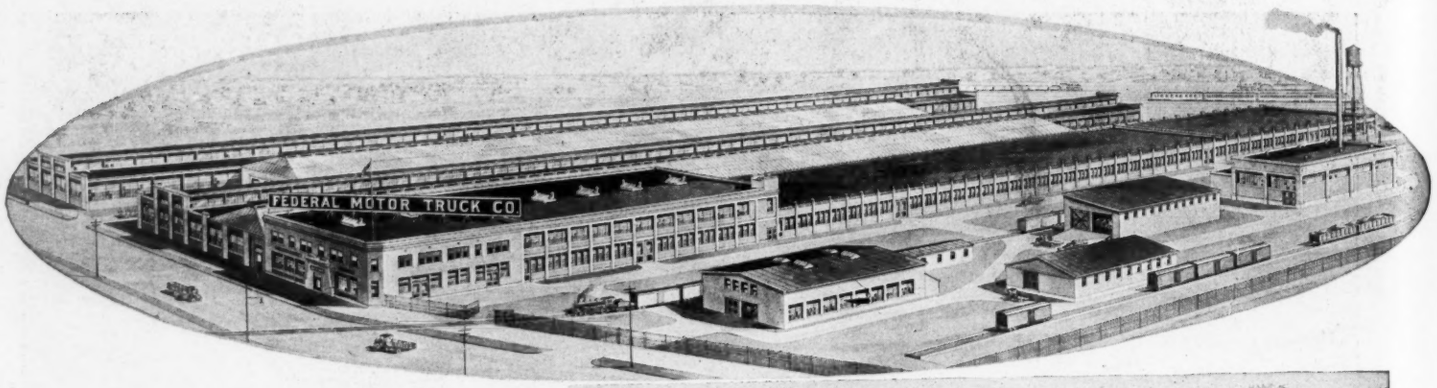
inability to obtain the necessary components of their vehicles, either in sufficient quantities or at anything like the time for which they were contracted. In other instances the parts and materials situation delayed, while it did not curtail, production, that is, outputs scheduled for one period were months behind schedule in coming to the factory, because some part which went into its makeup could not be obtained from the parts maker when needed.

Quite naturally this situation has had the effect in some instances of increasing the cost of production first and the selling cost as a result. More often, however, truck makers have been able, through their increased production and through more modern and economical systems of manufacture and distribution, to offset in part or wholly the greater cost of the component parts of their vehicles. The parts situation alone is not to be blamed for this, for the labor market has proved to be a type, as the materials market and cost of labor has increased proportionately.

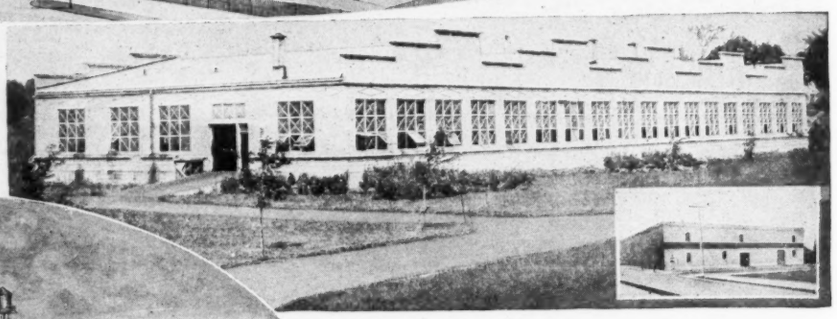
It may be that this increase in production cost may not prove to be an unalloyed harm. It is quite possible that improvements in factory and sales systems which have been forced upon the manufacturer by the abnormal cost of labor and supplies will be very valuable in meeting the attacks of foreign competitors when European conditions return to normal and the threatened trade war commences.

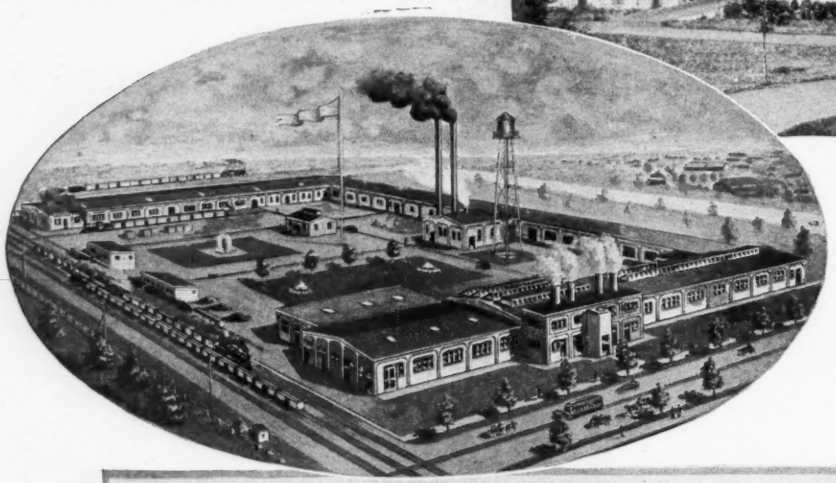
Moreland Motor Truck Co.'s factory at Los Angeles, Cal.

There are two or three sales problems which have been worrying truck manufacturers for many years. Incidentally these questions are ones which have been the object of much study on the part of passenger car makers. One of these is the second-hand truck. In some lines of business there has been great difficulty in solving the question of to what extent the sales department of the factory should take in second-hand vehicles when placing new ones. This situation seems to have moved toward a solution during the past year, some firms refusing flatly to consider any trading arrangements; others taking in only old vehicles of their own manufacture; still others taking in a second-hand vehicle only when they have a definite sale for it arranged; others, some with wide distribution through agencies, leave the



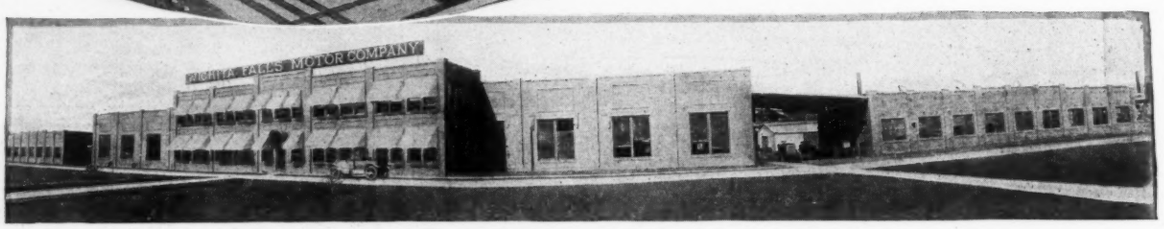
Above—The Federal Motor Truck Co., Detroit, Mich., has more than doubled its floor space in the last year. This company contemplates the building of several of the parts used in Federal trucks. This will mean further plant expansion



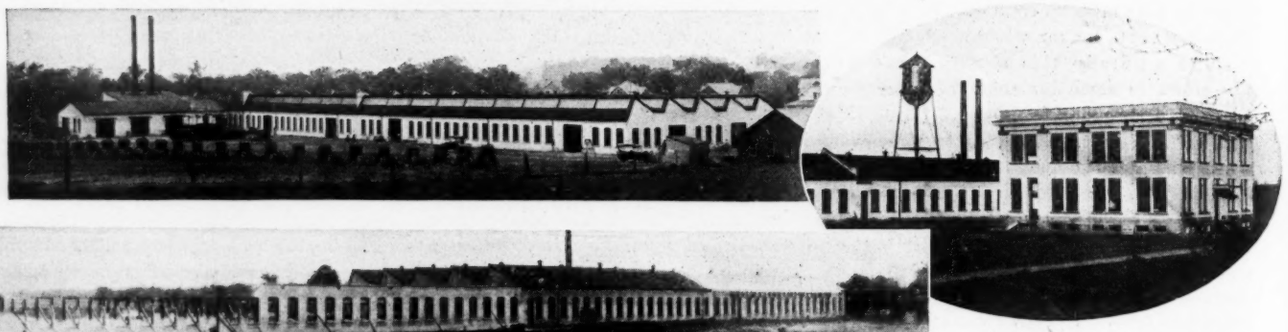


Above—Plant and main assembly building of the Dart Motor Truck Co., Waterloo, Ia. The insert is the warehouse

In oval—Plant of the Indiana Truck Co., Marion, Ind.

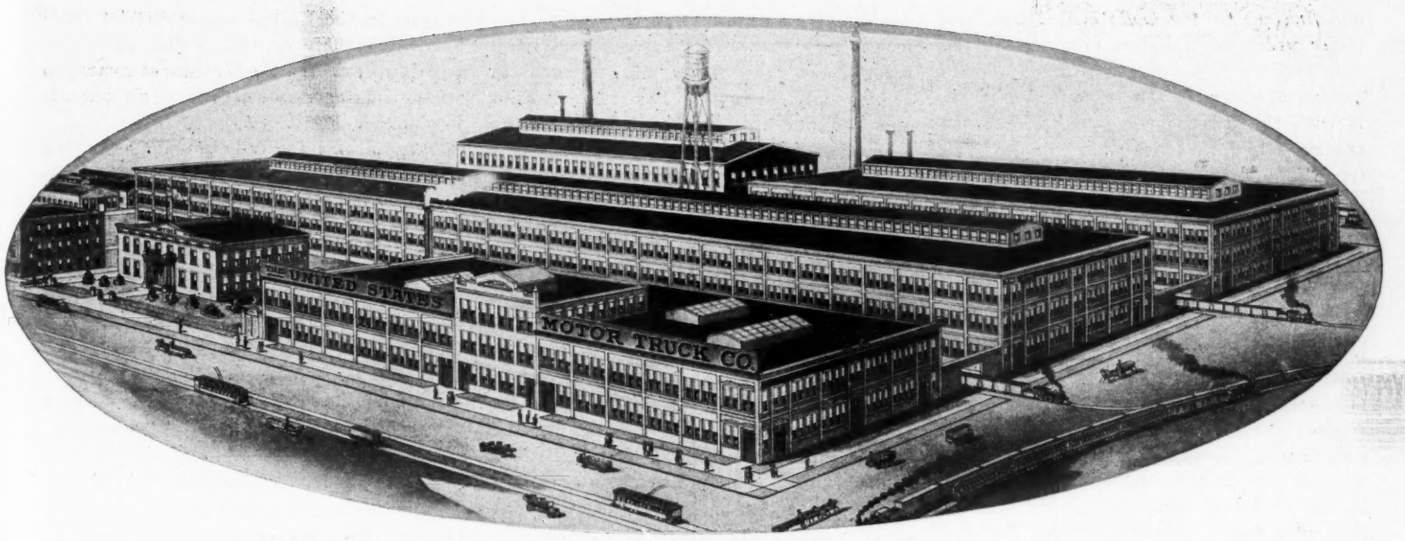


Above is shown a view of the plant of the Wichita Falls Motor Co., Wichita Falls, Tex., where both chain and worm-driven Wichita trucks are made

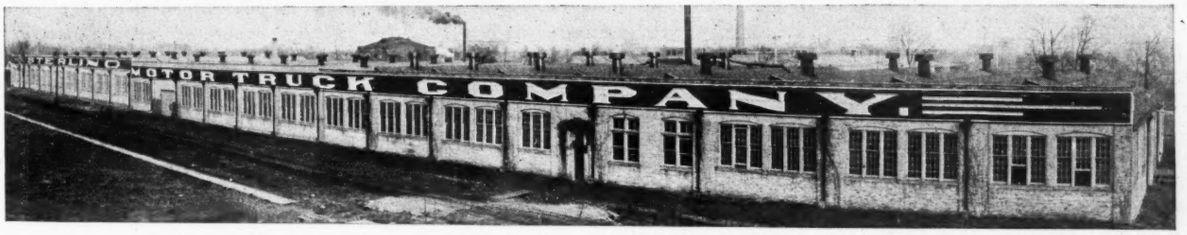


This is a view of the Four-Wheel Drive Auto Co.'s office and a partial view of the factory

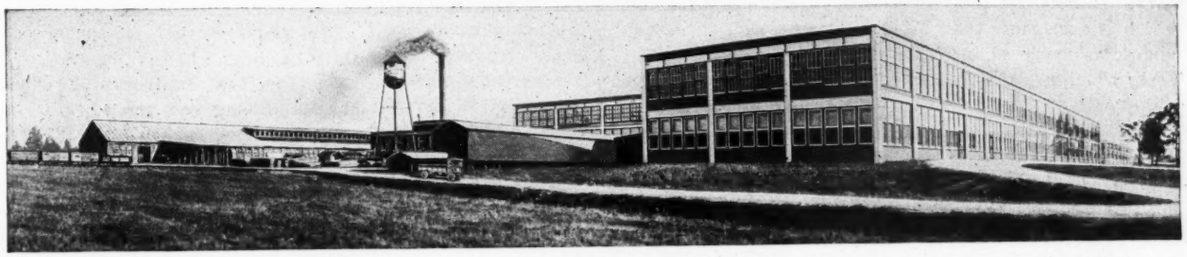
The Four-Wheel Drive Auto Co., Clintonville, Wis., has been making numerous additions to its factory. The view above is of factory No. 1 and below factory No. 2 during construction

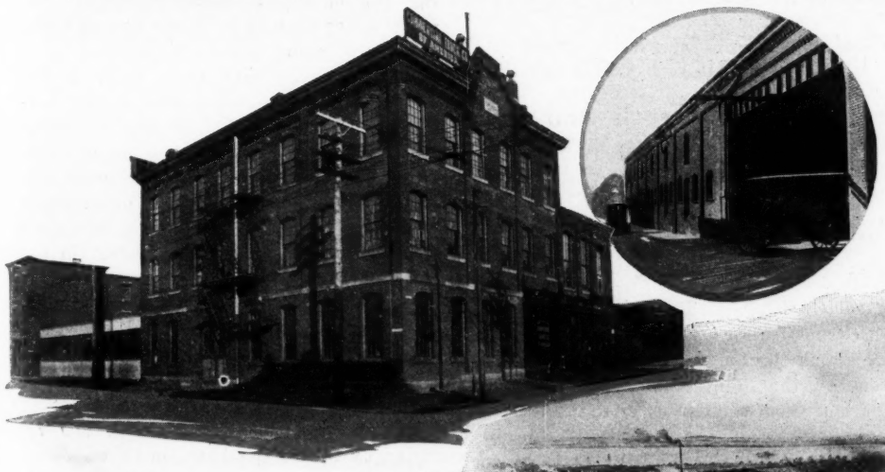


The United States Motor Truck Co., Covington, Ky., uses a part of plant of the Stewart Iron Works



The Sterling Motor Truck Co., West Allis, Wis., has increased its manufacturing capacity 350 per cent in the last year

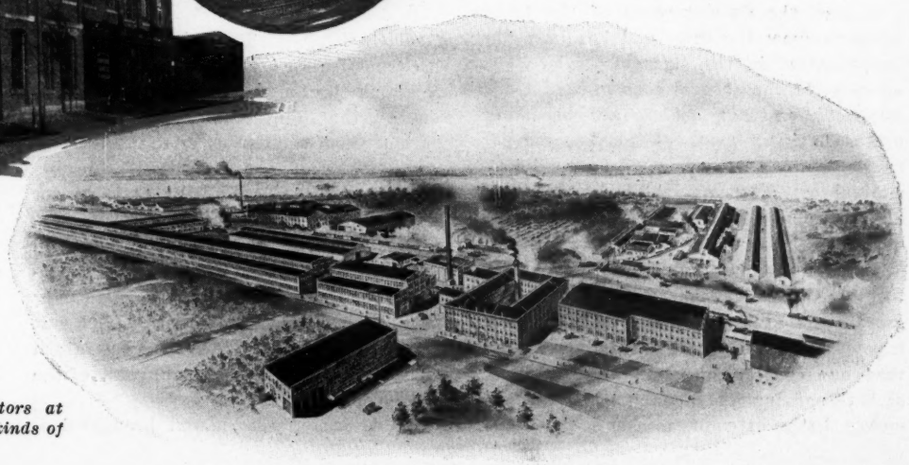




The Garford Motor Truck Co., Lima, O., is making additions for storage purposes to take the place of tents, which amount to about 15 per cent of the total capacity. Present production of Garfords is from ten to fifteen a day

In circle—Paint shop of the Commercial Truck Co. of America, Philadelphia, Pa.

Above—Main factory building of the Commercial Truck Co. of America, Philadelphia, Pa.



Right—Home of the Avery trucks and tractors at Peoria, Ill. The Avery Co. also makes several kinds of farm machinery

question up to the individual agent, the latter pocketing the loss or profit as the case may be. The question is not now as serious a one with the truck maker as it is with the passenger car maker, because the truck is not a seasonable vehicle. The truck is a unit in the organization of a business. Its body lines and style are secondary consideration. As long as it will give economical service, it is not likely to be disposed of except when a user desires to standardize his fleet with one make of truck as a general proposition. A truck is not disposed of as second-hand as long as it is capable of economical service.

Another of the problems which have confronted the truck maker is the price cutting among dealers and manufacturers themselves. The situation is complicated by the fact that many trucks are sold as part of a fleet. Orders may come for ten trucks at a time, and certainly manufacturers can build and sell ten trucks in a lot at less cost than they can sell ten trucks to ten individuals. Another complication comes in the fact that a large percentage of the truck business is special and sometimes special chassis business, and the standardization of price is not an easy thing. Many of the Chicago concerns hold that the situation is worse in that territory than in any other, because there are so many manufacturers of small output in this territory. Illinois has forty-two truck makers, which is even more than Michigan has and almost as many as in either Ohio or New York, which are the leaders.

Taking Truck Paper

The question of time payments for motor trucks is more of a credit man's question than a problem of policy. The equipment of almost every business is bought on the credit basis. There is no reason for attempting to sell the transportation equipment of a business on a different plan. True, the credit instinct and facilities of a manufacturer and a sales organization must be brought to bear in scrutinizing truck paper to just the same extent as it must be in any other business, but the problem differs from that of the passenger car industry in that a business large enough to need a truck is likely to have sound credit or capital to pay for it.

One of the developments of the truck industry from the sales end has been the improvement in the class of dealers. It seems to be the general consensus of truck sales opinion that dealers are becoming better business men. A good passenger car salesman is not necessarily a good commercial car salesman. The problems of distribution and sales arguments and the questions the agent has to meet are vastly different in the two fields. Both manufacturers and dealers are realizing this to a greater extent than before, to the advantage of both. So true has this been found that one concern, a very large producer of both passenger and commercial vehicles, makes little attempt to have the same dealer carry both lines and, in some centers where very successful passenger car dealers did not prove to be as successful in commercial car sales, has two distinct agencies, one handling the trucks and the other the passenger cars.

Another concern specializing in heavy equipment in the construction of material-hauling fields uses as its distribution mediums men who carry other lines of industrial appliances, such as concrete mixers, graders, power machinery and so on.

Effect of Road Improvement

One of the things that made for a very distinct growth in the truck industry has been the good-roads movement. The extension of good roads has increased the economical radius of travel of motor trucks from the main centers, has made suburban delivery in department stores possible and has developed the use of motor vehicles among truck growers and dairy men, where quick transportation of perishable goods is a necessity. It has made possible the installation of inter-city motor haulage.

The actual construction of the road improvement work itself has been quite an important factor in truck sales during the year. This work has developed a specialized class of motor vehicles and a very important one, as road construction is 75 per cent transportation of material and 25 per cent placing it. The development of good roads led to the use of heavier vehicles as well as to a more extended use of lighter ones. The heavier vehicles now have a wider radius of travel in suburban districts. The limit of capacity in motor trucks for work outside the cities, however, has about been reached. There is considerable feeling against loaded trucks of over 7-ton capacity on country roads on account of the damage they are believed to do to the road surface.

Open Truck Form War

Smith Form-a-Truck and Redden-Cook Interests Resume Legal Patent Battle

Royalty Arrangements Did Not Take

CHICAGO, Oct. 31 — War among the truck-forming makers was renewed today when the Smith Form-a-Truck Co. announced the filing of suit in the circuit court of Cook county to restrain Albert E. Cook, owner of the Cook truck-forming patents, and Charles W. Hills, attorney for Cook and the Redden Motor Truck Co., from representing that they have a valid contract under which the Smith Form-a-Truck Co. has agreed to pay royalties for operating under these patents. The suit also asks that defendants be restrained from intimidating dealers and agents of the Smith company.

This is in reply to a suit brought last August in the United States district court for the northern district of Illinois in Chicago by Cook and the Redden company, in which infringement of the Cook patents is claimed.

Negotiations for a harmonious working arrangement between the two interests were started since and during these negotiations an official of the Smith company signed what that concern claims to have been a memorandum providing for the payment of royalties to Cook and not valid until indorsed by the Smith board of directors. This instrument the cook interests seemingly hold as a valid contract. The Smith Form-a-Truck directors, it is claimed, refused to ratify the agreement.

FRANKLIN INCREASES PLANT

Syracuse, N. Y., Oct. 30—Factory expansion this year of the H. H. Franklin Mfg. Co. of this city, has been centered in six new buildings, giving an additional factory space of approximately 550,000 square feet at a cost of over $1,000,000. These increased manufacturing facilities are at present enabling the company to produce twenty-seven cars per day, as compared with eleven per day a year ago. Within the next 6 months the company will produce forty cars per day. Between Oct. 30, 1915, and Oct. 2, 1916, the production force has changed from 1,215 to 2,133.

The new factory space consists of a one-story building, 154 by 160, costing $40,000, used for the experimental department, chassis testing and the sawmill; a three-story building, 60 by 100, costing $30,000, for die casting; a six-story building, 108 by 265, costing $250,000 for manufacturing; an employment office and hospital, costing $4,000; a building for lumber drying, costing $6,000, and a six-story 240 by 300 structure now being built at a cost of $500,000 for shipping and manufacturing.

Improvements have been made in the methods of manufacture and in the handling of the employes. Among its major improvements in manufacturing methods is the development of humidified oven-drying apparatus for the paint department, which eliminates the use of the old style of brush in the paint shop, except in the last coat of varnish. To provide safety for its employees thoroughly a safety man, who was formerly in charge of the first aid room, is taking care of the safety devices. Not the least important in the changes during the year is the new method of rating workmen and supervisors, which has resulted so far in the increase in wages of 5½ cents average per man since April.

AMERICAN CHAIN BUYS STANDARD

New York, Oct. 31—Special telegram—The American Chain Co., Bridgeport, Conn., has bought the Standard Chain Co., Pittsburgh, Pa. The sales organization and part of the office forces will be combined January 1.

Greater Capacity Range for 1917 Trucks

Makers Offer More Sizes of Commercial Vehicles and Several Add Electric Lighting and Starting—Year's Development Shows Many New Features

FIGURES are often grand deceivers but in general are definite guides to progress. In this issue Motor Age prints the specifications of 137 different makers of motor trucks, giving the mechanical specifications of these trucks for the 1917 season. Trucks are not the victims of the annual-model regime to the same extent that passenger cars are, consequently an analysis of the following pages of specifications will not give as many changes in design and trends in engineering practice as a similar analysis of the passenger car specifications tables will afford.

While these figures give the definite indisputable facts as furnished by the manufacturers, still there are many places where these figures have to be interpreted in order to view the entire picture of motor truck progress in its true perspective. Thus while these figures may show a gaining of dual tires for truck rear wheels, still there has been activity during the past year in adopting larger single tires for such equipment instead of duals. One of the largest tire makers has been active in advocating single solid rear tires instead of duals for sizes in which the width does not exceed 7 inches. Another large tire maker has met with success this year in marketing a very large size of single solid tires made in widths from 8 to 12 inches. Such movements as these do not show in the tabulations because rarely are such equipments standard by truck makers, and so do not appear, as these specifications are based entirely on what the truck makers list as standard equipment.

Electric Lighting and Starting Gains Favor

One of the most notable movements of the year in the truck field has been the progress made by electric starting and lighting equipment. A year ago this movement had not gained noteworthy headway; there was a general feeling against it by many truck manufacturers, but today the fact that forty-one different concerns are listing electric starting and lighting as standard equipment is prima facie evidence that the truck field seems destined to follow fairly closely in the wake of the passenger car field in electric lighting and starting. Some of these firms are Jeffery, Republic, Overland, Studebaker, Reo, Stegeman, Knox, Hurlburt, Commerce, Universal, Wilcox, Little Giant, Cippard-Stewart, Dorris, Briscoe, Old Reliable, Couple Gear, Burford and some others.

Although forty-one concerns fit electric lighting and starting as standard there are many others that furnish it optional at prices ranging as high as $150 per equipment. There are thirty-eight concerns in this classification and among the names of such might be mentioned Denby, Federal, Garford, Grann-Bernstein, Kelly-Springfield, I. H. C., Kissel, Cippard-Stewart, Mack, Moreland, Packard, Riker, Selden, Service, Sterling, Wichita.

Up to the present there have been more makes of light-capacity vehicles fitting electrical equipment to their products than is found among those concerns making heavy vehicles. The answer rests in the fact that many of these vehicles are working in industries where night work is essential. Take a few examples: Within the zone of ten or fifteen of our largest cities nearly all department stores have much night delivery work. Often the vehicles are on the roads for hours each night in the fall and winter months. Good lighting is essential as are pneumatic tires. The pneumatic tires are needed because of higher speeds at which these vehicles must travel, because in making deliveries in zones where trips of 35 miles are common speed is the prime essential. This night work applies to furniture houses, piano houses, storage moving concerns, market gardeners, breweries in a smaller degree and various other lines where quick delivery service is essential. The work is not entirely confined to light-capacity vehicles; in fact, several large-capacity trucks with 5-ton loads are using such.

Two factors have retarded this development more than anything else, namely, technical difficulties and cost. Owners wanted electric light and while they had no especial desire for it, they certainly had no objection to electric starting, but they objected to the cost when legal lighting requirements could be met with kerosene and acetylene lights, and mechanical starting meant in many cases nothing more than convenience to the driver.

Heavy trucks on solid tires are subject to great vibration and many of the early attempts to fit electric starters designed for penumatic-tired, flexibly sprung passenger cars to trucks resulted in trouble. The battery in some cases gave trouble. The need was for a special outfit designed ruggedly enough to withstand truck service. Starter makers hesitated to undertake the expensive work of developing such equipment until they had more assurance of a growing demand.

In the meantime, it became evident that electric starting and lighting, in the case of the delivery truck, was in many cases a crying need and that the cost of installation was petty compared with the possibilities of economy. Vehicles in package work are obliged to make a large number of stops per day, a department store vehicle often making as many as 100 on a single trip.

To crank the engine by hand this many times would involve so much time as seriously to cut down the work of the truck for that day and would involve an amount of physical exertion on the part of the driver, calculated to have a deleterious effect upon his efficiency. If, as is usually the case, the motor is left running at each stop, which will possibly average from 1 to 2 minutes, much fuel is consumed.

Some reversals in expected lines of development are taking place in the truck field. One of these is that of steering wheel location. Originally truck steering was universal on the right side. The passenger car set the movement of left-side steering and was immediately followed by the truck industry; in fact, it was argued that there was greater necessity for left-side steering in trucks than in passenger cars, due to trucks working so much in city streets where traffic congestion is great and where it is essential for the driver to be able to look ahead to the left side of slower vehicles which he hopes to pass. This has all proven true, but a contradictory influence has also arisen.

Steering Wheel Location Undecided

For country work there is a growing feeling that the steering wheel on the right is preferable to the left. Generally speaking the truck is a slow-moving vehicle on country roads where there are so many touring cars. This means the truck driver must hold the right side of the road rather religiously. To do this it is easier to gauge his distance from the ditch on the right if the steering wheel is also on the right. This situation has developed quite considerably during the year and so explains why several concerns have reversed their steps and are now mounting steering wheels on the right. Among names that can be put in this classification are Chase, one model; Koehler, Krebs, Little Giant, one model; Selden, two models; U. S., one model, Universal, two models, and Matson.

This condition has been influenced to some extent by European orders, which, of course, require right steer, but there has been a well-defined insistence on the part of American buyers in some classes for right steer. This is especially the case

with road contractors and others who operate their trucks on country roads, since it is very difficult for the driver of a left-steered truck to determine how closely he may approach the ditch on the right side and with the present prevalent narrowness of improved country road and the concealed ditches, this argument becomes a weighty one.

Another question of design in which motor truck engineers are following passenger car practice is in the adoption of Hotchkiss drive, that is that form of rear axle design in which the springs are used to transmit the rear axle propulsion to the frames so that the car is pushed ahead, so to speak, and, further, these springs absorb the axle torque or the tendency of the axle to rotate in response to the propeller shaft drive.

Hotchkiss Drive in Universal Use

This form of drive is today in the majority for the first time. Several makers use Hotchkiss drive on 5-ton and 6-ton trucks; but generally its use is confined to trucks of medium capacity, since the thrust or propulsive duty on the springs assumes such great proportions in a heavy truck that nothing but the best type of spring and spring attaching will serve. During the year, several makers have removed radius rods from some of their models, however, due, possibly, to a better understanding of requirements for Hotchkiss drive.

Associated with this trend has been development in regard to propeller shafts. It has been the idea of many designers for some time to reduce the truck chassis to the same simplicity which is noticeable in the newer designs of passenger cars, by means of unit powerplant grouping of the engine, clutch and gearset and final drive by a single shaft with two universals.

Difficulties, however, have been encountered in the excessive length of such propeller shafts, due to the long wheelbases possessed by medium and large trucks. Passenger car methods cannot be pursued here, as small, solid shafts of such length are prone to whip and whirl, placing severe strains on universals, axle bearings and gearbox bearings.

Accordingly, much experimenting has been done with shafts made of large-diameter tubing, which with greater strength and little if any greater weight are much stiffer than solid shafts. Remarkably good results have been achieved on wheelbases of considerable length, but for the longest wheelbases it has so far been imperative that the shaft be cut into two lengths with a stationary bearing between the sections.

Some makers have provided this bearing at about the middle of a two-part propeller shaft, others splitting the shaft by interposing the gearbox between its two sections. This latter practice has given rise to a decrease in unit power plant assemblies and increased the percentage of makers who locate their gearsets amidships.

Calendar Year Had Few New Types

It cannot be said that the calendar year of 1916 has been prolific in truck development, a condition largely due to two causes: first, scarcity of materials due to war demands, and second, increased production. Many factories had as many orders as they could take care of and naturally you can scarcely expect a firm under such favorable conditions to set aside existing models and sell new types. Again, many truck makers who buy many of the components such as motors, gearsets, axles, etc., experienced difficulty in getting these parts in adequate quantities, in short, many makers of these parts could not meet the demand. Applying the same rule of human nature you could scarcely look for

Principal Features of 1917 Design Contrasted by Percentages with Those of 1916 Practice

FRAME MATERIALS	1916	1917
Pressed steel	67½	
Rolled channel	29½	
Rolled I-beam	2¾	
Wood	¼	

FRAME TYPES		
Semi-flexible	53	
Rigid	27	
Flexible	20	

TIRE TYPES		
Solid	87½	84
Pneumatic	11¼	13¼
Pneumatic and solid		1¼
Cushion	½	¾
Wood	0	⅜
Steel	¾	⅜

TIRE SIZES		
Front average	35x4½	34x4
Rear average	38x6	36x7½
Front, single	97¾	99
Front, dual	2¼	1
Rear, single	55	48
Rear, dual	45	52

WHEEL TYPES		
Wood		94
Cast steel		5¾
Pressed steel		¼

SPOKE SHAPES		
Square	64¼	
Oval	29½	
Disk	2¼	
Hollow	2	
Cruciform	1½	
Cross	½	

NUMBER OF CYLINDERS		
Four	96½	97
Six	1	2½
Two	2½	½
Three	0	0

ENGINE SIZES		
Average bore	4	4 1/10
Average stroke	5⅕	5⅓
N. A. C. C. hp.	25.6	26.5

NUMBER OF MOTOR BEARINGS	
With three bearings	88
With two bearings	8
With four bearings	2
With five bearings	2

CYLINDERS CAST	1916	1917
In block	59	61
In pairs	36⅓	36
Singly	4	2¼
In threes	⅔	¾

VALVE LOCATION		
Side	78½	83
Opposite	14	12
Side and head	3¾	¾
In head	3	4
Top, two-cylinder	¾	¼

WATER CIRCULATION		
Centrifugal pump	75¾	75
Thermo-syphon	20¼	20½
Gear pump	3	4½

RADIATOR CORE TYPE		
Finned-tube	51½	41
Cellular	29¼	32
Square-tube	14¼	17
Zig-zag-tube	4	7½
Ring	1	1½
Plain tube	0	1

RADIATOR CASE TYPE		
Sheet	70¼	56⅓
Cast	29¾	43⅔

IGNITION		
Single	73	75⅘
Dual	27	22⅖
Double	0	1
Dual-double	0	⅘

SPARK ADVANCE		
Hand	58	60
Fixed	24⅔	28
Automatic	15⅓	11
Two-point fixed	1½	1

ELECTRIC AUXILIARIES		
Starting and lighting	47	
Lighting	25⅔	
None	16	
Starting, lighting and ignition	7 1/6	
Starting only	2 1/6	
Lighting and ignition	2	
*Stock systems	18⅘	
*At extra charge	29⅗	
Average extra charge	$156	

* Percentage of all models.

GOVERNOR TYPES	1916	1917
Models with governors	76½	80
Without governors	23½	20
Centrifugal	59¼	71⅜
Suction	32⅜	21⅘
Loose-ball	7¼	5⅗
Hydraulic	¾	1
Electric	⅛	0

GOVERNOR DRIVE		
From motor	87½	88½
Duplex	5½	5½
From driveshaft	4½	5
From front wheel	1	1
AVERAGE GOVERNED SPEED		
In motor r. p. m.	1,233	1,221
In m. p. h. of truck.	15⅓	15 1/10

FUEL FEED	
By gravity	84¾
By vacuum systems	13
By pressure	2¼

FUEL TANK LOCATION	
Beneath seat	91
In dash	6⅞
At rear	1½
On running-board	⅝

CLUTCH TYPE		
Dry-disk	48	50½
Cone	26⅓	24½
Dry-plate	9	14
Disk-in-oil	13	9½
Plate-in-oil	1	1½

GEARSET TYPE	1916	1917
Selective	83½	85¾
Individual clutch	7	10
Progressive	5	2¼
Electric	1¾	1
Friction	1¼	½
Planetary	1	¼
Roller	½	¼

GEARSET LOCATION		
Unit with motor	52¼	49
Amidships	29	38
Unit with jackshaft	17½	11½
Unit with axle	1¼	1½

SPEEDS FORWARD		
Three speeds	76½	79¾
Four speeds	20	18¾
Two speeds	2½	¾
Five speeds	0	¼
Six speeds	0	¼
Infinite	¾	¼

TOTAL GEAR-RATIO		
Average in high	8¾-1	8⅞-1

FINAL DRIVE		
Top worm	44½	61½
Double chain	32¼	20
Internal gear	12¼	9¾
Bevel	7¼	6¼
Spiral bevel		1¼
Double-reduction	1	½
External gear	1	½
Roller	¼	¼
Single chain	¼	0
Bottom worm	¼	0

PROPULSION MEANS		
Springs	47¼	54⅝
Radius rods	48½	42⅝
Sub-frame	1¾	1⅜
Torsion tube	1¾	1⅜
Torque arm	¾	0

TORSION MEMBERS		
Springs	81	82¾
Torque arm	9¾	11⅜
Torsion tube	6½	2⅝
Sub-frame	2	1⅝
Radius rods	¾	1⅝

FOOT BRAKE TYPES		
Rear wheel	82	
Shaft	15¾	
Front wheels	1¼	
Four wheels	1	
Internal brakes	57¾	
External brakes	42¼	

HAND BRAKE TYPES	
Rear wheel	94
Shaft	6
Internal	91
External	9

STEERING WHEEL	1916	1917
Left	69	67⅝
Right	30¾	32⅜

LEVERS LOCATION		
Center	76	80⅞
Right	18½	13⅜
Center and right	3	3⅛
Left	2½	2⅛
Center and right	0	½

these makers of parts to spend much effort on new designs.

In spite of this many changes have taken place and while they cannot be called general throughout the industry and may have been put through by only one, two or perhaps half a dozen concerns, they nevertheless point the needle to possible lines of future development. In this respect the development of what is known as the flexible frame idea has made headway. Pierce-Arrow was the pioneer of flexible frame construction in its worm-driven truck, brought out in 1911. It obtained the idea in Europe where De Dion was one of the exponents of it. In the flexible frames pressed steel side members similar in cross section to those used on passenger cars are used. These side members are tied together in some cases by tubular cross members so that rigidity is not the ultimate aim, rather flexibility.

In former years few gave any special thought to the frame of a motor truck, deeming that its office was to be strong enough to carry the load and stiff enough to keep the parts in their proper relation. Lately, however, the advantages of the flexible type of construction have been realized to a greater extent, and while many makers still adhere to rigid construction, relying on the springs entirely for compensation for axle movement, there is an increasing number who are adopting the flexible forms. The majority of makers are using what may be termed the semi-flexible form of frame, usually of pressed steel and yielding to severe stresses while remaining stiff against minor ones.

Makers to Offer More Models

Truck manufacturers are practically unanimous in favor of marketing a range of models with varying capacity so that the dealer is able to meet a majority of the demands of buyers with regard to capacity. There are still a few concerns that hang to a one-model program but in nearly every case they are very firmly established in that particular field and can be classed as quantity producers. A few examples will serve to show how this broadening of models marketed has progressed during the year: Commerce, Jeffery, Knox, Overland and Reo have previously been one-model producers and have adopted the multi-model program in varying degrees for next year.

The range of models continues about as it has been for years past except that there are more of the intermediate capacities, while the average capacity of models produced remains about 2½ tons as it has been for several years.

In the range of models from less than ½ ton up to 7½ tons and tractors, there is a definite division into two classes, the first being the delivery vehicle class and the second the heavy-duty truck.

Delivery vehicles range up to and partially include the 1-tonner, and the latter begins with the ¾-tonner and goes up. Production of delivery chassis outnumbers that of trucks two to one, and of the heavier trucks, those which might fall into a medium class, that is, from ¾ to 2 tons. represent a number equal to all of the balance, including tractors.

Hence light chassis business is one of quantity production, and hence it is easy to understand why only 10 per cent of the commercial vehicle producers build 50 per cent of the vehicles. Delivery vehicles are usually mounted on pneumatic tires, each year witnessing a lesser percentage of chassis in this class equipped with solids. This is because only with pneumatic tires is it possible to run a vehicle at high delivery speeds, such as are demanded for efficiency, dispatch and economy, without rapid tire and mechanical depreciation.

This permits vehicles of this class to use passenger car design to a great extent with good success, and the majority of vehicles under 1,500 pounds capacity are largely made up of passenger car components, many of the latter being indeed identical chassis to those upon which touring car bodies are applied. There is a noticeable trend, however, toward following truck practice in the design of even the smallest commercial vehicles.

This is due to the fact that delivery vehicles are never called upon to sustain such high speeds as are demanded for passenger cars, while they are required to cover very much more ground in a day. Ruggedness and greater weight are therefore much to be desired for delivery vehicles which are to see severe service.

Two years ago, the 1,000-pounder was much in the public favor and a great number of these were built. Some of them were very light and were designed for package work where the weight of the load was a negligible factor and cheapness and speed were the prime requisites. Others were very elaborate and were designed for the severest sort of service, including overloading. Experience has shown that many of these were used for ¾-ton loads and that their owners preferred them to 1,500-pounders because they were lighter and cheaper to operate. This has resulted in minor changes in the design of many of these to adapt them to 1,500-pound loads with a corresponding increase in their capacity ratings.

Somewhat the same change is noticeable all through the range of capacities, accountable largely to the fact that owners are a little less prone to overload their vehicles.

Capacities change but little year by year, due to the necessary conservation in making radical changes in this respect. A survey of developments in the last 5 years shows that the greatest gains have been made in two intermediate models, the 2½-tonner, a comparatively recent development, and the 3½-tonner, which has been gaining steadily for years. The 3-tonner and the ¾-tonner have been losing steadily, since these capacities were set arbitrarily by manufacturers before the industry had built sufficient trucks to really know what was demanded.

The price change this year has only amounted to an average of $137, most of the models being increased but little. The trucks of less than ½ ton and of ¾ ton capacity have been the ones whose prices have undergone the greatest increases because of the abandonment of many antique designs in these capacities in the face of the popular demand for better quality and stamina in the low capacities. These trucks average much higher, but they are also immeasurably better vehicles than were formerly offered and today one may buy a truck of ½ or ¾-ton capacity which will give the same reliable and enduring service as the best of the heavy trucks.

Three-Speed Gearset Favored

The disinclination of the American operator to shift gears more often than avoidable is reflected in the failure of the four-speed gearset to make more progress. It has, in fact, lost slightly in favor of the three-speed, despite the recognized fact that four-speed gearsets give the truck greater ability in difficult going and particularly in hilly country.

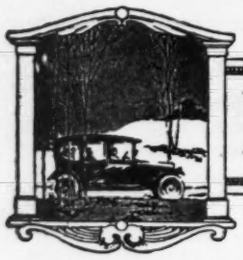
Somewhat of the same effect has been accomplished, however, by a slight increase in the size of the engines and slightly greater gear-reduction. More of the makers than ever are fitting governors, their undoubted tendency to restrict power on the lower speeds being avoided in an increasing number of cases by driving them from the driveshaft instead of the motor or by using the combination drive from both motor and driveshaft.

The steel wheel is once more in evidence, this time in a fewer number of forms, the cast type predominating. Doubtless the difficulty of getting wood wheels for part of the time this year has had its influence, but it is safe to predict a growing application of steel wheels to the heavier capacities.

In wood wheels, the square spoke is the most popular type, since it affords a wider bearing on the felloe and is actually cheaper to manufacture than the older oval type.

SPEEDERS FINES TO STATE

Columbus, O., Oct. 30—Speeders cannot be prosecuted under municipal ordinances, but only under state laws regulating speed, according to a ruling of State Examiner C. E. Lippincott, of the state bureau of accounting, who filed a report on the village of Gibbonsburg, O., holding that the mayor and his marshal must return a $5 fine and $2 costs assessed against Harry Oberst for speeding, because the prosecution was under a city ordinance and not a state law. This means that the fines assessed against speeders must go to the state and not to local funds.



EDITORIAL PERSPECTIVES

Painting a Truck Canvas

FUTURE possibilities of truck design are problematic. It is to be hoped that truck makers will view the future in its correct perspective, take a broad national and international view of it, not a view prejudiced too much by any particular design of part. Tendencies of manufacturers to unite along petty lines are rarely potential in the long run. The fewer wheels within wheels, the better. A good national truck spirit is indispensable. Such a spirit is the best safety valve any industry can have. Such a national spirit preserves the correct perspective of an industry, whereas a number of minor organizations, wheels within wheels, generally operate to the disadvantage of each other. In union there is strength, a maximum most adaptable to the truck industry. Instead of patent litigation it is often preferable to get your feet under the same table, take a few straight looks in the eye and talk sound business. Why give the lawyers time and money that might enrich our own coffers?

THE fuel question for trucks is vital. Today it is not upon us like it is in some other parts of the world. Take South Africa, where gasoline sells at 88 cents per imperial gallon; take Argentine, where it is 60 to 70 cents; take Brazil, where lines of motor buses were put out of commission due to the high fuel cost. Other examples could be cited. Fuel is a paramount problem with truck operation; it is going to be a more acute issue as years pass.

IF GASOLINE continues to rise, then a temporary solution lies in kerosene, but it is certain that the eventual solution is alcohol. This matter demands first-hand consideration by truck makers. It is much more important than question of design of this or that truck part. A stitch in time saves nine. It is poor policy to wait until the crisis arrives and then have to sputter and putter to bring out makeshifts to meet immediate demands. Taking time by the forelock, these are the days to consider the alcohol question. These are the days for laying the corner stones of alcohol motor development. By starting today definite progress will have been made before the fuel question gains too much stature. Petroleum interests have already taken a step in this direction.

THERE must be close co-operation between fuel producers and truck manufacturers. Joint committees could work together. It will not do to have the fuel makers bending their effort along one line and truck makers moving in a different direction. The respective efforts must coincide.

LET us move onto the hilltop of mature contemplation and take a good long-range perspective of the great canvas of motor truck development now being painted by the scores of motor truck makers. Look over the canvas from end to end and from top to bottom. You may find yourself on that canvas working in some little corner, trying to paint a sub-picture of your own which is all out of joint with the general scheme of the picture. Sooner or later your entire little sub-picture will be washed out by one swoop of the great paint brush of true development, and in your place will be painted those efforts that are in harmony with the main scheme of development. The last word has not been uttered in motor truck design. The story is in its early stages.

Our School of Design

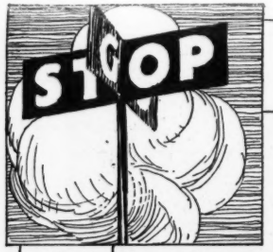
THE year now drawing to a close has been the biggest production year in the motor truck industry in the United States. Beginning with the placing of large war orders in the fall of 1914, a new stimulant was administered to the motor truck industry. Up to that date, truck business was not an easy one. Little by little the industry progressed, little by little one industry after another took up the use of trucks, but it called for such an unusual force as the war demand to start the industry rolling and gaining momentum. The momentum was not by any means all due to war orders, but there was all last year a decidedly increased domestic demand. During the present year our own war business has made up to quite an extent for the dropping off of foreign business in 1916 as compared with 1915.

WITH such a pronounced truck demand as has existed for over 2 years, it is not surprising that production would be the one great aim of the manufacturer. It would be almost inhuman to expect a manufacturer behind in deliveries to slow up production to bring out new models. The engineering activities have been tuned along production rather than development lines.

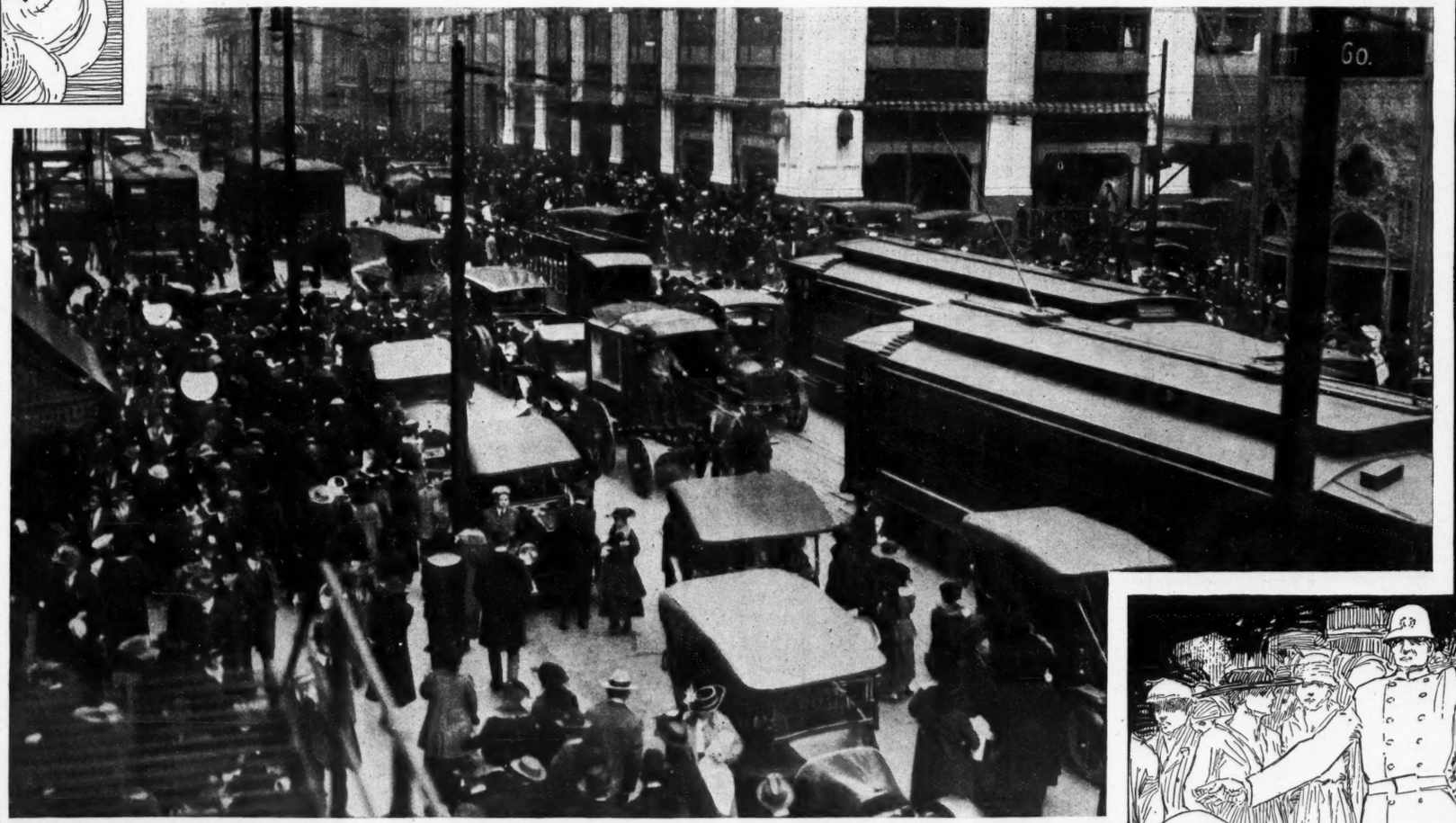
IT IS not regrettable that such a situation has existed. Our trucks in very many instances have been more nearly perfected than are the transportation systems of the business houses using them. Failures in truck performance have often been laid at the doors of the truck industry, whereas the true fault has been in the poor application of them by the business man. These same trucks, now that demand has increased, are giving a good account of themselves and the business man in many places has learned the trucks are still better than his methods of application and his own business systems.

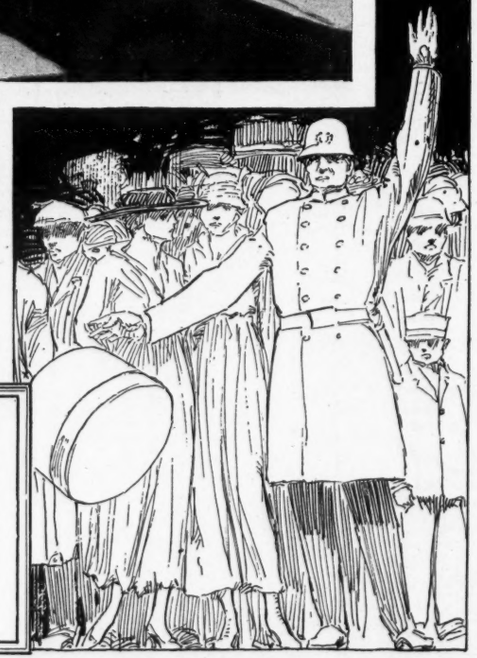
THE progress in truck development for several years—in fact, until 4 or 5 years ago—followed the trend of passenger car development. There was not a distinct school of truck engineering. Those concerns building their own trucks naturally adhered very closely to their passenger car design. Those assembling vehicles had little option other than to use those components available, which frequently were primarily intended for passenger car use. This combination of circumstances hitched the truck industry quite closely to the car trade.

THE development of a school of truck engineering extending over the past 5 years has conspicuously modified conditions. The new truck models bear testimony to what has been done. Our parts makers for several years have been developing motor, axle, frame and other designs along recognized lines; in short, each year sees truck designing advancing farther and farther along its individual course. As a school of engineering it is getting out of its swaddling garments; it is walking and soon should be advancing with the strides of a robust youth.



Great American Thoroughfares





STATE AND MADISON, CHICAGO, WORLD'S BUSIEST CORNER

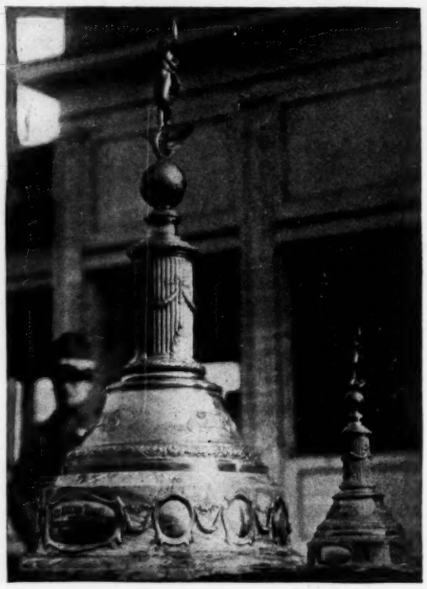
THIS shows a moderate Saturday afternoon crowd in the heart of Chicago. Traffic officers do yeoman duty in directing the streams of humans, cars, trucks and horse-drawn vehicles. There is seldom much difficulty here for wheeled traffic, although pedestrians find passage anything but easy.

Aitken Breaks 100-Mile Record

Wins Harkness Trophy Sheepshead Bay Race at 105.95 M. P. H.— Leads for A. A. A. Championship

NEW YORK, Sheepshead Bay Speedway, Oct. 28—Today's race of 100 miles on the speedway here was nearly a record cracker. It cracked all previous American records ever driven for the century and came within 7.52 seconds of equaling the famous world's record made on the Brooklands cement track in England some years ago. Aitken, one of the real deans of American racing, was able to clip practically 47 seconds off the record pace he set on this speedway in the Astor Cup race 4 weeks ago today. Aitken tonight has the proud distinction of driving 100 miles west of the Atlantic ocean faster than any other person living or dead. He turned the century in 56:37.65. This is a pace of 105.95 miles per hour. Aitken set a pace of 104.83 miles per hour 4 weeks ago and bettered it quite considerably today. The pace is ahead of that set by Resta a year ago in this same race, a speed of 105.39 miles per hour.

Aitken's victory today places him in the lead of the American speedway championship over his great and worthy rival, Dario Resta, who led the championship percentage until today when the Indianapolis hero snatched it away from him in a race as good as any ever seen on an American speedway.



The Harkness trophy, the cause of it all

Today's Harkness Trophy race was a race between Aitken and Resta. It was conceded before the start it would be a fight to the finish between these two masters of the steering wheel and it proved a veritable duel. True, Galvin brought his Premier into second place only 12 seconds behind Aitken and Wilcox had his Peugeot only a matter of seconds farther back, third, but to all the grandstands, to those in the bleachers and to those in the parking spaces the race was a duel between Aitken and Resta, the two leaders and real contenders for the 1916 speedway championship.

Brain driving won for Aitken. He drove his Peugeot-rival, Resta, off his feet and eliminated him at 66 miles with a broken

Results of 100-Mile Race

Pos	Car	Driver	Time	M.P.H.	Prize
1	Peugeot	Aitken*	56:37.65	105.95	$4,000
2	Premier	Galvin	56:45.35	105.71	2,500
3	Peugeot	Wilcox	57:10.53	104.9	1,500
4	Maxwell	Henderson	59:04.70	101.31	1,000
5	Duesenberg	DeVore	59:05.47	101.3.	600
6	Benedict	Benedict	59:23.88	100.9	400
7	Hoskins	Hughes	1:01:47.1	98.2	....
—	Peugeot	Resta	.....	....	1,400

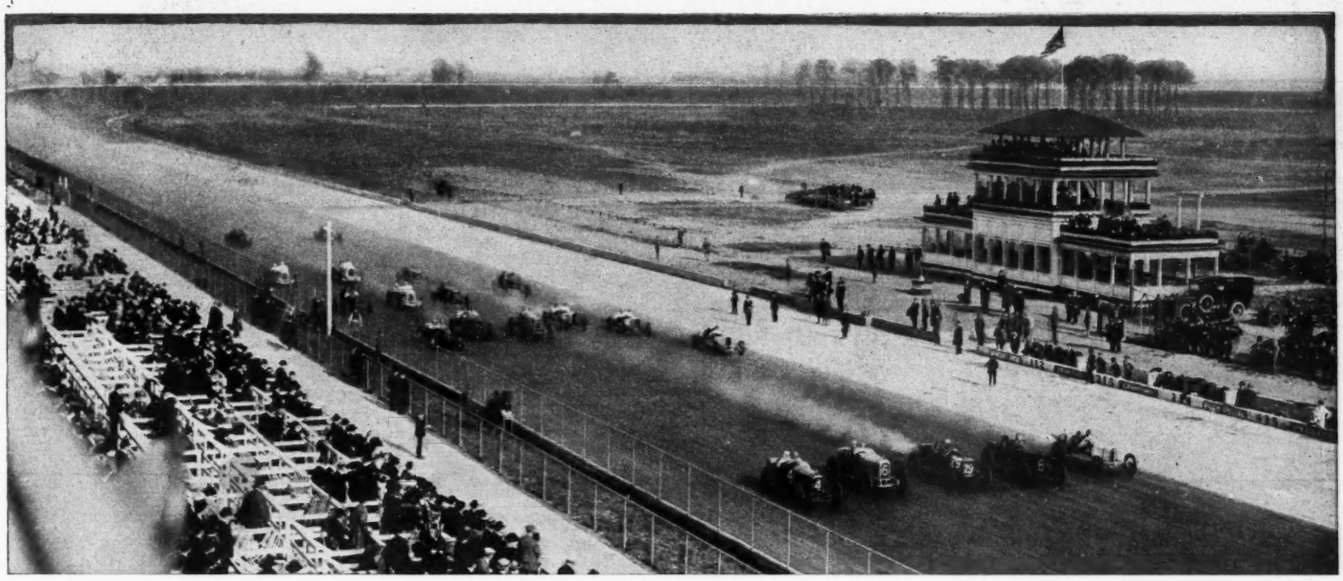
*Lap Prizes—$1,400 additional.

Leaders at 10-Mile Intervals

Miles	Driver	Time	Speed	Prize
10	Aitken	5:39.0	106.2	$ 100
20	Aitken	11:05.0	108.2	100
30	Resta	16:28.35	109.3	100
40	Resta	21:52.0	109.6	100
50	Resta	27:22.0	109.5	250
60	Aitken	33:49.0	106.2	100
70	Aitken	39:33.0	104.2	100
80	Aitken	45:16.0	106.0	100
90	Aitken	50:54.0	106.1	250
100	Aitken	56:37.65	105.95	4,000

The intermediate laps which had prizes of $50 each were divided between Resta and Aitken, so that they took $1,400 each, Aitken making the final prize of $4,000 in addition, or a total of $1,400 to Resta and a total of $5,400 to Aitken.

Aitken, at the right, wears the smile that comes from winning the Harkness trophy race and leadership for speedway championship. Lecain, at the left, ran away with the 50-mile consolation race



The start of the 100-mile Harkness Trophy race, showing the line-up of twenty-one cars. The majority were running when the seven prize-winners finished

crankshaft, almost indisputable testimony that the pace Aitken made him go was too fast for alloy steel, for at that distance the admired Italian pilot went out with a broken crankshaft. The motor died on the backstretch and Resta with his mechanic valiantly pushed the silenced Peugeot nearly half way around the course to the grandstand, where the 4,000 spectators sprinkled through the stand did not even greet the heroic gladiator of the steering wheel with a faint cheer. It was pathetic. Resta deserved better appreciation.

First Half Run at 109 m.p.h.

The race was the hottest ever witnessed. It was run at a pace of 109 miles per hour until tire troubles ended the space-annihilating flight at 56 miles. Here Aitken was seen to slow up on the back stretch and some seconds later limped to the pits with a soft right rear tire. Twenty seconds later and he was off. The fleeing Resta was nearly a lap ahead of him. Scarcely had Aitken got moving at his old pace, facing the task of overtaking Resta, when the Italian was seen to slow up on the back stretch at 60 miles and he too limped into his pit. A speedy change, and in less than 20 seconds he was in flight again, the speeding Aitken not being able to catch him before leaving the pits, but passed him on the turn. Aitken soon had 4 seconds lead on Resta, the next lap Resta had cut it to 2.5 seconds and it looked as if 66 miles would see the two running radiator to radiator.

But it never came. Resta slowed perceptibly entering the back stretch, his pace dwindled and dwindled. When he passed the mile post on the back stretch he was coasting at touring car speed. When he reached the third turn he stopped. The end had come. Field glasses were trained on the long Peugeot as it rested at the rail. The bonnet was lifted. A moment later it was closed. The next minute the long laborious task of pushing the Peugeot nearly a mile to the grandstand by Resta and his mechanic was started.

Signalling the glad tidings of a fallen hero

Richard Kennerdell and F. E. Edwards of the A. A. A. contest board at races

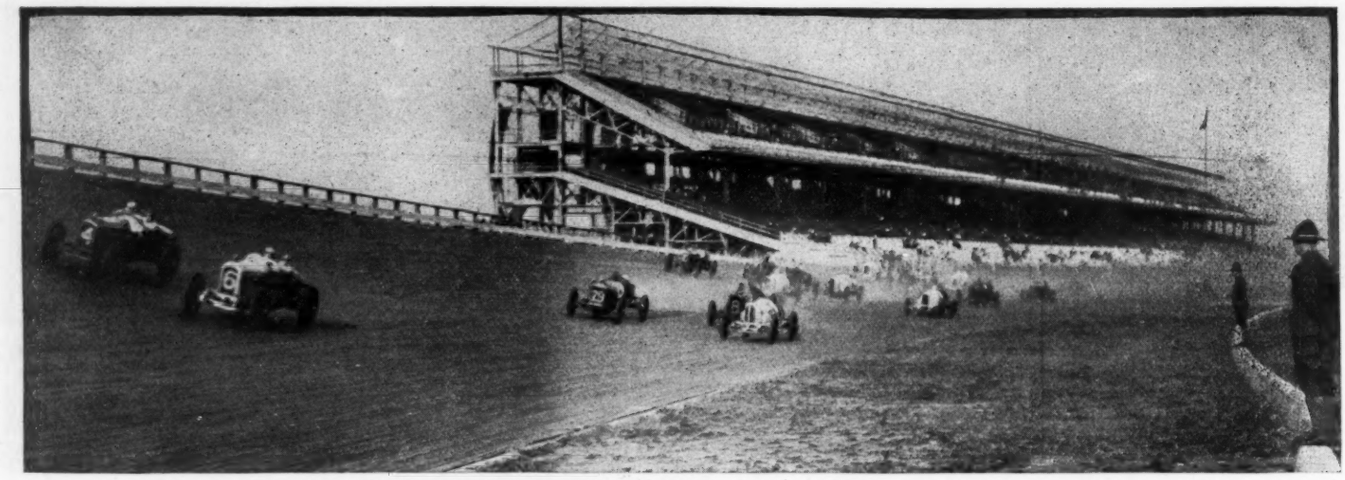
Aitken seized the moment. His great rival out, the Indianapolis wizard cautiously took his pit signals. Immediately his pace, which had been 64 and 64.5 seconds to the lap was changed to 66 seconds, a couple of laps later and Aitken had changed it to 68 seconds. Here he set his house in order and carefully gauging the distance started a safe-and-sure game of finishing the century without further tire troubles and thus making doubly sure of clinching his holding on the speedway championship, and all the racing honor that goes with it.

So far as the 10,000 spectators were concerned the race was over. There was only one result, Aitken. They kept their seats and waited for the finish and the next race.

Aitken Drove Brainy Race

Aitken deserves credit for his art of today. It was a masterful effort. He drove a brain-set pace. From the start of the race until tire troubles set in at 56 miles Resta and Aitken were never more than a length apart. Lap and lap they passed the stand side by side. One lap Resta led by half a bonnet length. A few laps later Aitken had reversed the positions. As today's race gave cash prizes for the finishers of each lap there was some little interest over which led each lap. The amounts varied from $50 to $100 per lap. Resta carried off the lion's share of this lap money until his finish, in short, he had a two-to-one advantage over Aitken.

It was perhaps this appetite for the lap money that was Resta's undoing. True he set the pace, but it was a pace Aitken forced him to set. Drive as he would Resta could never get a car length ahead of Aitken. It was a heart-breaking ordeal for Resta. The racing wiseheads commented on how he drove. It was easily seen that he was maneuvering on the high



The cars were well bunched on the first lap of the 100-mile. This shows Resta and Lewis leading the field

banked curves for an advantage, but that advantage never came. Whatever track diplomacy Resta exhibited Aitken duplicated and in several instances added to it. Occasionally Aitken would ride particularly high on the steep bank and then swoop hawk-like after the Italian and cross the tape a length in advance. Resta, aroused, would reclaim his position on the back stretch, perhaps to lose it in the home-stretch. Aitken played every card he could draw from his stock-in-trade of speedway knowledge. It was this expertness that worried the Italian, who was never called upon in his racing career on this side of the Atlantic to drive a harder race. It was a conflict of masters, a duel of high-explosives, a race that motor fans may wait years to see duplicated.

Nature could offer nothing finer as a setting for so historic a conflict. For days the sky was the finest autumn blue and today seemed better than all previous days. There was scarcely a breath of wind. Not a cloud blotched Heaven's blue. It was such a day as any bride would crave as a wedding setting. Nature was strong, but human following weak. The sprinkling through the huge double-decked grandstand was pathetic. Conservatively not 5,000 saw the race from the stand. In the bleachers was a smaller number. The infield had less than 150 motor cars. It was no attendance for so great a conflict. Enthusiasm was lacking and those outbursts of cheers that Aitken and Resta merited were wanting. When Aitken finished there was but a faint ripple and it was not until he pulled up beside the pit after having traveled an extra lap or so for safety that the stand seemed to awaken to the occasion and greeted the victor with a respectable cheer. A performance which came so near nailing a world's record to this speedway deserved more exultation, but unfortunately the stands were not well enough advised during the progress of the race, and many who might otherwise have been at white fever heat were pardonably lukewarm.

50-MILE SHEEPSHEAD BAY RACE FINISH TIMES

Place	Car	Driver	Time	Speed	Prize
1	Delage	Le Cain	28:49.59	104.2	$1,000
2	Duesenberg	Milton	30:15.8	99.25	600
3	Pugh	Myeer	30:16.36	99.1	400
4	Duesenberg	Devlin	30:17.11	99.0	300
5	Hoskins	Hughes	30:31.40	98.25	200
6	Crawford	Muller	30:32.4	98.15	None
7	Crawford	Kline	31:09.65	96.5	None

A. A. A. Championship Standings

Aitken	3,440	Le Cain	120
Resta	3,200	Oldfield	80
Rickenbacher	2,210	Toft	75
De Palma	1,790	Pullen	75
D'Alene	1,120	Halbe	60
Milton	690	Cooper	55
Henderson	667	Stringer	55
Galvin	645	Adams	55
Mulford	620	Devore	50
Christaens	540	Gable	45
Lewis	500	Chandler	40
Vail	450	Watson	35
DeVigne	350	Sorenson	35
Hughes	290	Johnson	30
Buzane	210	McCarthy	25
O'Donnell	185	Burt	25
Wilcox	180	Muller	20
Delvin	140	Benedict	30
Klein	125		

Figures best narrate the consistency of the struggle: For 30 miles the speed was over 109 miles per hour. It started at 106.2 for the first 10 miles, jumped to 108.8 at 20 miles, was 109.3 at 30 miles, rose to 109.6 at 40, varied to 109.5 at 50 and was then pulled down to 106.2 at 60, due to stops for tire changes by both Aitken and Resta. With Resta out there was not the incentive for Aitken to continue at his previous paces and we find the average remaining at 106.2 at 70, then dropping to 106 flat at 80, rising to 106.1 at 90 and finishing at 105.95 at the country.

World Record Just Missed

Had Resta remained a few laps longer, or had Galvin's Premier or Wilcox's Peugeot been a bit faster the record flag that has waved over Brooklands for so many years would unquestionably have been lowered. Had Aitken's pit managers been better coached the record bunting might have been brought to these shores, but reflection is useless. It is too late. The opportunity has passed. We must wait for another day.

Wilcox, in a Peugeot, and Galvin, in one of the new Premiers, deserve special mention. Galvin drove a consistent race. He made no stop. Lap after lap he varied but little and while lost sight of in the Aitken-Resta episode he played a strong part in the complete setting. Premiers covered themselves with honor in finishing so well in such fast company in the first year of their racing career.

Wilcox had scarcely such good fortune. He had to stop at 46 miles to change a right rear. Up to that time he was always one of the first three. The order of passing the grandstand was: Resta, Aitken and Wilcox, or Aitken, Resta and Wilcox. Wilcox was rarely over 100 feet back of the

Lewis pushes his disabled Premier to the pits

Among "those present" were, from left to right, Mrs. G. Rickard, Mrs. Kermit Roosevelt and Mrs. Theodore Roosevelt, Jr.; standing, Kermit Roosevelt and G. Rickard

leaders. His tire change was not so good as either Aitken's or Resta's. He consumed 25 precious seconds. After that he was never alongside of the leaders.

The also-rans divided honors, four of them finishing within the money, the cash being divided between a field of seven. Maxwell, Duesenberg, Benedict and Hoskins shared the remaining positions in the order noted. With the exception of the Maxwell the other three used Duesenberg motors, so it might be classed as a Duesenberg day in this part of the field. With the exception of the Hoskins all averaged over 100 miles per hour. Henderson, in the Maxwell, was less than 1 second ahead of De Vore, in the Duesenberg. Unfortunately this hard-fought duel for 100 miles was lost sight of by the majority of the spectators. It was a race within a race, and staged as a separate attraction would have been a grandstand thriller from start to finish.

Some Favorites Among Unfortunate

The tale of the unfortunates, those that started but stopped before the allotted time embraces the names of favorites and others. Rickenbacher's Maxwell went out with a broken piston before the race was one-half over. He traveled up with the first group pursuing the Aitken-Resta duet.

Vail's Super-Six Hudson went out at 20 miles with a burned connecting rod bearing.

Le Cain's Delage was out at 40 miles with valve trouble.

The Lewis Premier stopped with carbureter trouble at 50 miles and did not continue.

Of the other twenty-one starters the majority were running when the seven that carried off the money finished and were then flagged off the course.

Of the two Crawfords, one stopped with carbureter trouble and the other was running at the finish.

Today's race did not afford sufficient data to secure a correct estimate on how cord tires endure at a pace of 109 miles per hour or higher. Only two definite cases are at hand, that of Aitken's right rear at 56 miles and Resta's right rear at 64 miles. It would scarcely be correct to draw deductions from these two examples. In the 250-mile Astor Cup race on this speedway a month ago Aitken did not change a tire in that distance, but he rarely traveled at an average of over 105 miles. Today, for 30 miles, he averaged over 109 miles per hour and these added 4 miles appear to have had a serious influence on tires.

One factor entered into today's race that was wanting 4 weeks ago, namely that both Aitken and Resta did immeasurably more jockeying for favorable positions and so imposed a proportionately greater strain on the tires. They rode high on the banks to gain impetus on the stretches, a practice which imposed an added strain on the cord pneumatics.

The winner's equipment included Goodyear cord tires, Miller carbureter, Hartford shock absorbers, K. L. G. spark plugs, Bosch magneto. Oilzum was used. All who finished also used the Miller carbureter.

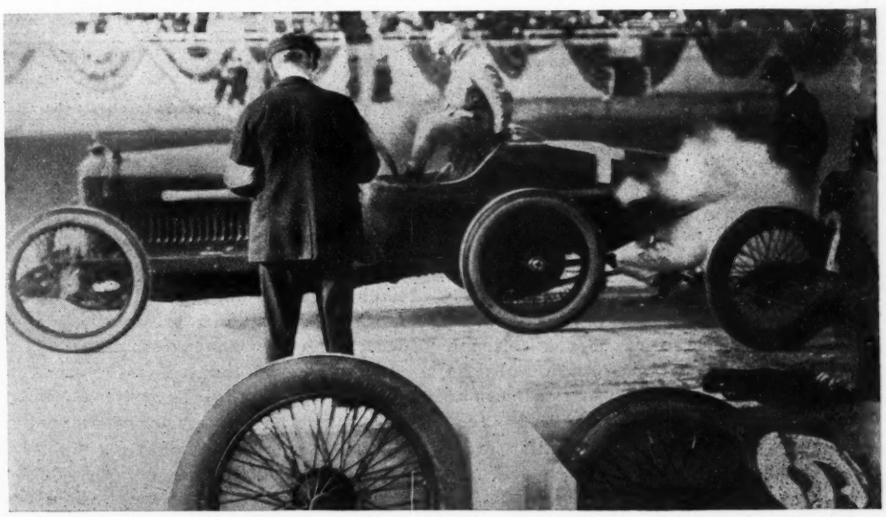
A bear cub was the mascot

Lecain Takes Consolation Race

After the 100-mile curtain was rung down there was a consolation race of 50 miles for those not finishing in the money in the big show. Eleven cars started in this race which proved an easy victory for Lecain, in the Delage, which averaged 104.2 miles per hour for the distance. No records were broken and it was a procession from start to finish. The race divided itself into three groups. Lecain, in the first group, making a runaway of it. He lapped a goodly portion of the field at 26 miles and had the entire field a lap back of him at 44 miles. He did not have to stop and generally was alone on the track excepting when lapping the two groups into which the field divided itself.

The first group was made up of a Crawford, driven by Kline, Milton's Duesenberg, Meyer's Pugh, and Devlin's Duesenberg, running a lap back.

The second bunch included Hughes' Hoskins, Vail's Hudson—on five cylinders—and Muller's Crawford. Both of these groups were very considerably slower than the winning Delage.



Resta changing tires at 64 miles. He went out with a broken crankshaft 2 miles later

To Decoy Gas Frauds

Massachusetts State Sealer to Ask for Four Testing Cars For His Use

Each Machine to Have Accurate Measuring Tank Built In

BOSTON, Mass., Oct. 28—Gasoline dealers of this city will no longer give short measures if the plan of Thure Hanson, state sealer of weights and measures, works out. He will ask the legislature, at its next session, for four motor cars to act as snares for the dealer's measure fraud.

Hanson proposes to have each car equipped with a decoy tank made of glass, which will be marked in quarts and gallons like a graduated scale of a druggist. These tanks will be connected with the filling pipes of the regular tanks in the ordinary manner and so concealed that any gasoline dealer will think he is filling any ordinary car tank. When a purchase has been made the inspector can tell at a glance whether he has received more or less than he purchased, and it will be impossible to refute the evidence as presented by the tank because it will be so constructed that its accuracy will be beyond question.

Massachusetts will be the first state to take the matter up in this way. Commissioner Hanson has received many complaints from motorists that they were not getting full measure, and he has had his men inspect more than 1,000 pumps, some of which gave too much and others not full quantity. The cars with the glass tanks will work in different sections of the state so that it will be possible to inspect a large number of pumps.

COAST THEFTS AFFECT INSURANCE

Los Angeles, Oct. 27—Because of the constantly increasing number of thefts of motor cars in California, the insurance underwriters are contemplating an increase in the rates on this risk. It was announced by an officer of the Pacific Automobile Underwriters' conference that the increase might be as high as 200 per cent unless the police authorities show such activity in making arrests and obtaining convictions that the conference would have reason to believe the loss for the coming year will be less than for 1916.

OHIO CONTESTS TRAFFIC CODES

Columbus, O., Oct. 30—The traffic code recently adopted by the Columbus council will be regarded as unconstitutional, at least in parts, if the Ohio Supreme Court upholds the decision of the Court of Appeals at Fremont, O., which has declared against a somewhat similar ordinance passed by the Fremont council.

City Attorney Scarlett appointed Joseph A. Godown, special counsel in the city law department, to assist the attorney of Fremont in defending the case in Supreme Court, following a request by Fremont officials. Mr. Godown had an important part in drawing up the Columbus code and in safeguarding it by legal provisions.

The Fremont case involves the power of a municipality to pass an ordinance making it a municipal offense to operate a motor car on city streets at higher rate of speed than that fixed by state law. The object, it is understood, of both ordinances, is partly to bring into the city treasury the fines assessed against offenders, which formerly went to the county. It is estimated that the Columbus code, if it stands, will bring at least $5,000 a year to the city.

PUZZLE: WHAT IS GASOLINE?

Los Angeles, Oct. 27—The question "What is gasoline?" is a stumbling block in the way of the state weights and measures department to force dealers to give full measure in selling gasoline. All the municipal weights and measure departments also are in a state of perplexity on the subject. The claim is made that if dealers do not care to sell gasoline, there is nothing to force them. They can sell distillate, and many of them are said to be doing it. Others mix the two and, it seems, the state is without authority to act, because no legal definition has been incorporated in the statutes as to what is gasoline.

RECOVER STOLEN CARS

Los Angeles, Oct. 27—With the mayor of the city, chief of police, president of the Chamber of Commerce and other dignitaries looking on or actively participating, the return of twenty motor cars that had been stolen from their owners was marked by an elaborate ceremony. The cars had been recovered through the agency of the theft bureau of the Automobile Club of Southern California. The wholesale thefts are assigned to an organized gang, which is believed to have been disrupted by the arrest of the leaders after a thrilling chase across a desert.

INFORCE AUTO-LOCK ORDINANCE

Detroit, Oct. 29—The police in this city are inforcing the city ordinance that requires all car owners to lock their cars if left unguarded. Several machines which had been parked beyond the legal limit had been taken to headquarters and found to be without locks, in consequence of which a vigorous prosecution of offenders has been announced.

It is expected that the inforcement of the law will result in a decrease of larcenies which have lately become more frequent. The ordinance does not apply to the downtown district alone, but includes every section of the city where the operator leaves the car unguarded.

Seek Fender Indorsement

Chicago Ordinance May Become Effective by January 1 If Sanctioned

Truck Owners to Fight—Say Devices Impractical

CHICAGO, Oct. 28—Chicago motor truck owners are mobilizing their forces to combat the proposed inforcement of the truck fender ordinance. Last July when the ordinance was adopted, 6 months were given in which to test out the various fenders which local concerns were making an effort to have indorsed by the police department. Chief of Police Healy has refused to give his indorsement to the devices submitted but the concerns who have fenders to offer have gone over his head and in fact ahead of the ordinance and had an amendment passed in the city council in an effort to get their certificate of approval November 1 instead of January 1.

Truck owners and their organization, the Motor Truck Owners' Association, are preparing to fight the ordinance. During the last 2 or 3 months truck owners have attempted to purchase fenders for the purpose of making tests as to their practicability, cost to keep in repair, and general operation, and the association believes that these attempts have stirred up the fender makers who want to get city endorsement prior to the original limit given. So far no one has been able to purchase fenders from any of the firms seeking certification and the Motor Truck Owners' Association voices the opinion that the fender makers want city indorsement in order to interest capital to manufacture.

Fenders Are Impractical

Secretary Ertsman, of the Motor Truck Owners' Association is emphatic in his statement that the fenders are impractical from a mechanical standpoint and also from the standpoint of increasing safety. He says the type of fender is practically the same as the ones used on street cars several years ago and which the street car companies found to be responsible for more accidents than for lives saved. He says the constant vibration in a motor truck moving over rough streets would soon put such a fender out of order and he believes that were any of these suggested fenders adopted, their saving of life would be an exception rather than the rule. The ordinance specifies that 4½- and 10-inch clearance and Secretary Ertsman points out that the majority of drivers would keep it at the 10-inch position, in which case a person would be likely to go under rather than fall upon the fender. If a 4½-inch clearance were used, the fender would be so low that in passing over bridges, railroad crossings and other uneven places that it would very likely be damaged.

Four local companies and one from Minneapolis are bidding for favor from the city council. Fundamentally, the device that each proposes to make is the same. The Truck Owners' Association will meet November 1 to discuss the situation, but no action will be taken against the proposed inforcement of the ordinance until after January 1, 1917.

ST. LOUIS HAS NOVEL JOY-RIDERS

St. Louis, Mo., Oct. 30—Another form of joy-riding has been discovered by the Automobile Manufacturers' and Dealers' Association, who will take steps to check it. One truck firm, a member of the organization, reported the loan of a demonstration truck for proving its ability to do some work for a local firm. After 3 days the truck firm learned the supposed prospect was an habitual borrower of trucks and that, as far as could be learned, was not in the market until all demonstration trucks had been used.

The advertising committee promised to announce a plan to check joy-riding in demonstration trucks this week. It is believed that this particular firm has obtained more than 50 days' work on the pretense of wanting demonstrations.

The association will charge 50 cents admission for the motor show to be given in February. This was decided at its October meeting. Various members were called on at the meeting to give opinions of the open week held recently on the row, and with three exceptions, all approved.

COLE PRICE INCREASE

Toledo, O., Oct. 30—Prices on Cole Motor cars will be advanced Jan. 1, 1917. The amount of advance has not yet been stated. The present effective price which was announced last January is $1,595.

BLAMES CAR FOR LESS REVENUE

Boston, Mass., Oct. 28—President James W. Hustis, of the Boston & Maine Railroad, tells his stockholders passenger revenues have decreased in the New England states in which the company operates, because of the rivalry of the motor car. He says that while the freight receipts have been larger than ever the passenger revenues during the last year declined 3.1 per cent and during the last 3 years there has been an increase of 94 per cent in cars or 31 per cent each year. New Hampshire leads the other states in the New England group in per capita ownership, and in that state the railroad has a long mileage and attractive resorts to draw tourists. According to his report, at present based on registrations, there is one motor vehicle for every thirty-four persons in Massachusetts; every thirty in New Hampshire; every thirty-nine in Maine; every thirty-two in Vermont and every thirty-nine in New York. His report does not suggest any remedy, as he realizes that motor cars have come to stay and that they will increase each year.

Packard Builds Rapidly

Bird's-Eye View of Plant Gets Out of Date While Being Finished

6.6 Acres of Floor Space Added During Last Year

DETROIT, Oct. 27—Fourteen months ago the Packard Motor Car Co. ordered a bird's-eye view made of their plant. When it was finished it was found to be old compared with the number of buildings added after the photograph was taken. The company has endeavored, three times since, to secure a bird's-eye view but always with the same result. The building construction has been so rapid and vast that each view is always one or two stories or buildings behind.

During the last year, 6.6 acres of floor space have been completed, while 4 acres are under course of construction, making a total space of 58.2 acres of floor space that the company will utilize for the manufacture of its products. The buildings completed recently cost $1,000,000 and those in the course of erection amount to $350,000. The company will have a total of 66 buildings when all planned for immediate construction are finished.

The plant operates on the progressive assembly and manufacturing system based upon six divisions arranged as follows: machinery; stock conveying; chassis erection; motor assembly; enameling, and final assembly.

The final assembly is conducted in one of the new builings that parallels the stock rooms and is so situated that the bins can be loaded with fifty car lots of various stocks at one time, and the workers are never forced to move more than 7 feet from the stock supply. Both floor and overhead trolley conveyors are in use. The bodies are lowered onto the chassis by means of the overhead system.

The company employs 12,000 men and plans to use 15,000 when the buildings now being erected are completed. They do much for their employes and have commenced several schools besides erecting a clubhouse and baseball grounds.

The schools include courses for salesmen, truck manufacture and motor work, and also the teaching of English to foreigners. Students can learn shop mathematics, mechanical drawing and other engineering work, so that they become eligible for promotion to the engineering department. Classes are held at night and at present include more than 250 pupils. Five teachers, experts in the various engineering branches and holders of responsible positions in the factory, have charge of the classes.

A factory hospital under the supervision of a staff of four surgeons and three nurses is connected with the plant, and all employes must undergo an examination before they receive employment. They are then entitled to hospital treatment if they receive injury during their working hours.

The company also organized and fosters what is known as the Recreation League, for which they pay all expenses and have erected a club and athletic field. Each year a picnic is held for all employes and is usually attended by from 10,000 to 15,000 people.

UNITED MOTORS PURCHASE

Lockport, N. Y., Oct. 30—The Harrison Mfg. Co., capitalized at $250,000 and employing about 250 hands in the manufacture of automobile radiators was sold Monday to the United Motors Co. It is stated that the deal involved $1,000,000. The Lockport radiator is the invention of Herbert C. Harrison, president of the Harrison company. The concern started here five years ago. Officers of the Harrison concern will try to retain the plant.

NEW STEEL TUBE CO.

Detroit, Oct. 29—The Michigan Steel Tube Products Co. has been incorporated for $300,000 by Charles E. Miller, Howard A. Flagg and Frank Kritz, all formerly with the Standard Welding Co., of Cleveland. The new concern will manufacture steel tubing.

MAXWELL OLD-CAR SERVICE

New Castle, Ind., Oct. 30.—The Standard Motor Parts Co., New Castle, Ind., has completed arrangements with Maxwell to take over from the latter service and repair departments, together with all stock on all Maxwell models, with the exception of the current model. In the deal just closed, the New Castle company has taken over the Maxwell-Briscoe, Maxwell 4-35, Maxwell 6-50 and Everett cars.

DENVER GASOLINE DROPS

Denver, Colo., Oct. 28—Motorists have been made merry this week by another 1-cent drop in the price of gasoline, which is now retailing at 21 cents at all the filling stations and many garages. Some garages charge a few cents more, on the ground that they handle gasoline mainly as an accommodation and cannot afford to bother with such a small volume of business for the 2-cent margin of profit maintained by the regular filling stations. The wholesale price to the filling stations and garages is 19 cents, while the price direct to consumer from the oil companies' tank wagons in 25-gallon lots or more is 20 cents.

No unusual reason is given for the decrease in price. This is the fourth reduction of 1 cent within the last 3 months, following a long period when the retail price stood at 25 cents. The other changes took place August 14, September 8 and September 26.

Empire Worms Increase 400 Per Cent

Company Plans to Produce as Many Axles in 4 Months as in Whole Year

DUNKIRK, N. Y., Oct. 30—That the motor car and truck axle manufacturing companies are sharing in the general prosperity of the country is manifested in a statement made by the Empire Axle Co. that it will put out as many axles in the first 4 months of the coming year as it did in the whole year of 1916. It has increased its daily capacity in worm-drive axles more than 400 per cent over that of a year ago.

Increased demand and production necessitated an increase during the year of 54,600 square feet in factory space, centered mainly in three new buildings, 85 by 110, 30 by 50 and 85 by 100. The first building is being used as an assembly plant, tool making and some machine work; the second is an addition to the assmbly plant, used as a forge shop; the third is not yet built, but will be used for the machining of castings, etc.

Keeping in line with the general improvement in working conditions of the modern factory, the company has made several important installations in its plant. Scientific sanitary facilities for its employees in the way of steel lockers, shower baths and special lavatories have been added. Bulletin boards displaying new safety-first ideas, safety appliances and guards on all machinery are provided also.

The gradual increase in its business has made necessary two shifts throughout the plant. The heat-treating department has been operating night and day for the last 6 months.

ACCEPTS MAXWELL CHALLENGE

Detroit, Mich., Oct. 30—George H. Maines, Flint, Mich., has notified the Cunningham Auto Sales Co., of this city, that he accepts the challenge to pit a Maxwell stock car against any other car selling for $1,000 or less in a speed and economy race in Michigan. Mr. Maines accepts in behalf of a Chevrolet and suggests a race from Detroit through Pontiac, Flint and Lansing and return to Detroit by way of Jackson.

MAXWELL DRIVERS RESIGN

Indianapolis, Ind., Oct. 31—Rickenbacher and Henderson have resigned as drivers of Maxwell racing cars. Both will be at the wheel of the sixteen-valve Duesenbergs which William Wakeman has entered in the coming Grand Prix race on the Pacific coast.

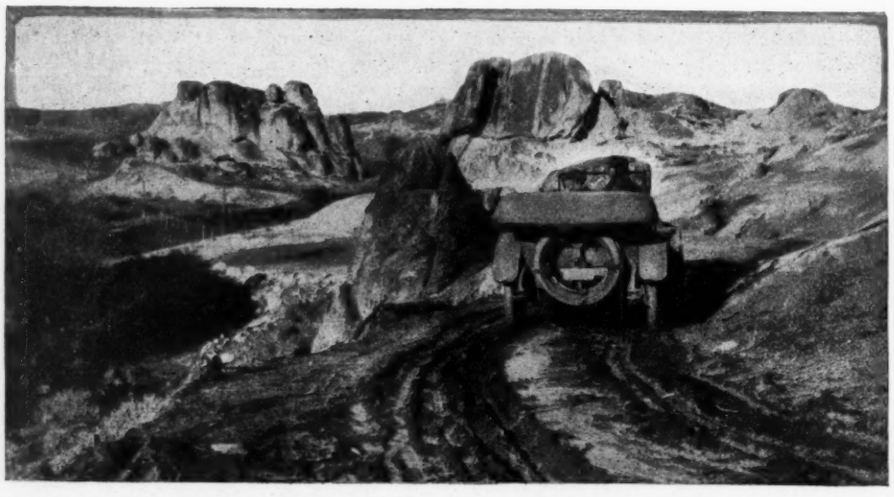
ALFORD JOINS NASH

Kenosha, Wis., Oct. 30—W. H. Alford is vice-president and comptroller of the Nash Motors Company, manufacturers of Jeffery motor cars and trucks. He recently resigned as comptroller of the General Motors Co., which office he held for four years.

HUPP TOURISTS REACH PACIFIC COAST

Fresno, Cal., Oct. 30—Special telegram—The Hupmobile United America good roads car reached Fresno Monday morning after a week spent in California, during which a detour was made from the regular route to take in San Francisco and Los Angeles, as well as to travel over both the coast and valley routes to southern California. From Sacramento the tourists went to San Francisco, where they were guests of the Lincoln highway officials. Next they proceeded to Santa Barbara, where the film people took charge. Harry von Meter, one of the American stars and an enthusiastic motorist, met the party at Santa Barbara and escorted them to Universal City, where they were the guests of Vice-President H. O. Davis. In welcoming the tourists Mr. Davis said that while he was not a governor he was proud to be an official at one of the "film capitals" of the world. He spoke of the good roads movement as a means of helping the circulation of films. At the Los Angeles city hall, the message from Mayor Rolph of San Francisco was delivered to Mayor Woodman of Los Angeles.

Sunday the party started north for Carson City, making Bakersfield for the night stop. Carson City will be reached Tuesday noon and Reno Tuesday night, where they will be guests of Reno's commercial club. Every member of the party is enthusiastic over California roads, which they say are the best of any state so far visited. The total mileage to date is 9,756 miles.



Hupp capital-to-capital car en route to Boise, Ida. Among the picturesque typical western formations known as Castle Rock

HIGHWAY MARKED TO OMAHA

Omaha, Neb., Oct. 30—Work on remarking and standardizing the official road signs along the Lincoln highway has been discontinued for the year due to the approach of winter. The two Overland cars, carrying the sign painters, have been working westward since early spring, and have so far completed 1,750 miles of their work.

Eight thousand markers were placed along the highway during the year. All right and left turns were clearly indicated. A similar painting trip will start from Oakland, Cal., next spring, traveling to Salt Lake City and east along the highway.

RAILWAY WATCHES DRIVERS

Boston, Mass., Oct. 29—In an effort to make motorists obey the law that prohibits drivers from passing a street car when it is taking on or leaving off passengers the Bay State Street Railway Co. has now given orders to all its motormen and conductors to take the numbers of such drivers and make a full report of the occurrences to the company. The officials will then determine whether to write to the offenders or to have its attorneys summon the drivers into court. As the company operates from Manchester, N. H., down through Eastern Massachusetts to Rhode Island, covering all the cities and towns, it will have a good chance to break up the practice.

K. C. HAS TRAFFIC TROUBLES

Kansas City, Mo., Oct. 30—Kansas City is having a serious time securing new traffic regulations. The legal department of the city has prepared an ordinance that represents much hard work and study and that, in general, has the approval of many factions. The Automobile Club's position is having a great deal of effect in support of the proposed ordinance, though the club is neutral. Some assume that if the proposed law were not satisfactory to motor car owners, the club would object strenuously and that if there

were any better ideas than are displayed in the ordinance, the club would present them.

The merchants insist that they want their patrons to have the privilege of parking their cars on the business streets while they shop. They do not object to the exclusion of parking from downtown cross streets which are very steep and mostly have car lines. But they want the privilege of parking on Eleventh, Petticoat Lane, the street recently pictured in Motor Age.

SCHREIBER TO MANAGE NEW BRANCH

St. Louis, Mo., Oct. 30—William Schreiber, who has been connected with the Paige, Premier and other distributing agencies here, will be manager of the new factory branch of the King Motors Co., which is to open here. A service station, carrying a complete set of parts, will be in charge of a factory expert. The salesroom will be opened this week.

CANADIAN SERVICE POLICY

Montreal, Que., Oct. 30 — A standard service policy will probably be adopted shortly in this country, following the adoption of standardization in the United States by motor car manufacturers. A standard policy has been drawn up and sent to the manufacturers for approval, and they already have indorsed the policy, and its general use by manufacturers is thought to be assured. A framed copy of the policy will be hung in the salesroom so that buyers will have an opportunity of seeing just what to expect in the way of service.

SHAW TAXI INCORPORATES

New York, Oct. 30.—The Shaw Corp. has been formed in New York with a capital stock of $900,000 in preferred stock and 40,000 shares of common. The new enterprise will hold the entire capital stock of the Walden W. Shaw Livery Co., the Shaw Cab Mfg. Co., and the Yellow Cab Co., all operating in Chicago. As rapidly as possible 700 new yellow cabs will be constructed, bringing the total to an even 1,000, according to the company's plans.

VANDERBILT OBJECTIONS VANISH

Los Angeles, Cal., Oct. 28—It is announced by officials of the Santa Monica Chamber of Commerce that the objections of property owners along the roads to be traversed by the Vanderbilt Cup and International Grand Prize races, November 16 and 18 to use of the thoroughfares for this purpose will be overcome amicably and there will be no postponement of the contests due to this cause. The trouble that has arisen is attributed to the fact that a part of the famous Santa Monica course is in a district recently annexed to the City of Los Angeles and there is an ordinance prohibiting the use of any city streets for motor racing purposes.

Cars Are Declared Cause of Paralysis

Infantile Disease Said to Be Traceable to Motor Vehicle

CINCINNATI, O., Oct. 28—According to Dr. Thomas F. Harrington, Deputy Commissioner of Labor of Massachusetts, infantile paralysis may be traced to the introduction of the motor car. He is well known in medical circles. The paper was delivered before the American Public Health Association at its annual convention in this city.

Dr. Harrington said that until the introduction of the motor car there were no epidemics of infantile paralysis, and he suggested that the government assume control of the use of the fluids to prevent illness. He gave results of investigations made by his commission in Massachusetts on deaths from poisonous gases. Among other things he said:

"In addition to cases of poisoning in munition plants, there were seven cases, with four deaths, from benzol poisoning in motor car tire making factories, and four cases, with two deaths, due to fumes from the use of nitric and sulphuric acid."

EMERSON GETS FACTORY

New York, Oct. 30—Special telegram—The Emerson Motors Co., this city manufacturer of the Emerson four-cylinder car, deliveries of which are soon to start, has purchased a factory in Kingston, N. Y., where the car will be produced in quantities. The factory purchased last week is known as the Peckham plant. The deal for it was made with Almirall & Co.

This factory, when equipped, will have a capacity of 100 cars a day. There is a machine shop 424 by 70 feet; a main factory, 487 by 224 feet will be used for assembly purposes; and in addition four warehouses with floor area of 70,000 square feet.

At present there is no machinery in the plant, but as soon as the floors are finished machinery will be installed.

Besides this new plant the company has a factory at Long Island City of 18,000 square feet, where the first 100 cars will be built. The Emerson Co., early in October, placed its contract for the manufacture of 500 motors with an outside concern. These motors are to be delivered by contract before January 8. The company has already built ten cars, which have been running for test purposes. More than 100 frames are already on hand and the other 400 are on the way to the factory. The 500 bodies are well under way and will be delivered by December 20. Ninety axles are on hand, and two carloads are in transit. All the 500 will be delivered by December 21. There are 100 gearsets, 200 sets of springs and 300 sets of lamps on hand. Starters are to be coming through at fifty a week. The same stock of parts applies to many other minor components of the car.

The finances of the company October 1 are shown by the audit report of the American Audit Co., this city, which shows liquid assets at that date of approximately $551,000; cash on hand, $307,447, and securities, $182,000.

Reproduction of Mexican border scene in C. S. Henshaw's window at Boston, Mass. Mr. Henshaw is agent for the Dodge

Independent Oil Men Want Kerosene

Relief Committee Indorses Two Devices—Relation to Gasoline Industry Discussed

A GOOD idea of the oil industry and how it is affecting gasoline production was given by H. G. James, secretary and general manager of the Western Petroleum Refiners' Association, at the recent meeting of the Independent Oil Men's Association in Chicago. As reported in the last Motor Age issue, the independent oil men are considering a plan to convert existing gasoline cars into kerosene cars. M. J. Byrne, of the gasoline relief committee, which was appointed last April, strongly indorsed the device invented by John Good and that owned by the Holley Bros. Co., Detroit.

Professor Lucke, head of the engineering department of Columbia University and also a member of the gasoline relief committee, discussed the subject of kerosene devices very fully in a paper read at the June meeting of the Society of Automobile Engineers this year. On that occasion he stated that the problem of successfully burning kerosene in an ordinary motor car engine has been solved.

The Good vaporizer uses a heating device consisting of a very long venturi within the exhaust header. The intake manifold is directly beneath the exhaust, so the gas does not have to pass around the cylinders to get to the intake valves. The throttle is placed between the spray nozzle of the carbureter and the vaporizing venturi. One of the main features is the length of the venturi, which permits a very high velocity in the front, while it does not cause the great drop of pressure and, therefore, limit the possibilities of cylinder filling. The engine can be started as on gasoline. Engine and burner start simultaneously. In cold weather, Professor Lucke says, there is less starting trouble than with gasoline.

In regard to these two kerosene devices, Mr. Byrne said:

Assuming that the duty of the committee is to locate and designate such processes or devices as in the judgment of the members are best calculated to—

(1) Suggest a plan for producing more or cheaper gasoline; or

(2) Provide by mechanical means a method by which kerosene or some other known fuel, less expensive than gasoline, may be made commercially practicable; or

(3) Provide a new substitute fuel capable of competing.

We have endeavored by advertising in oil trade and other journals to enlist the interest of inventors and manufacturers in our research to the end that all known devices might be brought to our attention and at the same time lend stimulus to others whose dormant plans by encouragement may be brought to fruition. It is not our purpose to criticise any scheme but rather to report the result of our findings with such recommendations as these may seem to warrant. It is our opinion that for the time being at least kerosene offers the most hopeful source of fuel supply for motor use and its application, therefore, is among the very serious problems confronting the engineering experts of the time.

From many which we have had under consideration no others have seemed to offer so much encouragement as the invention of John Good, Brooklyn, N. Y., and a device owned by the Holley Brothers Co., Detroit, Mich. These, we feel, merit, and should receive, our recommendation as well worth encouragement and support. The latter company is not interested in individual sales nor are they prepared to take individual orders, but prefer to sell their product in quantities to manufacturers. The Good invention, on the contrary, is available to those who may apply. Mr. Good is not interested to the extent of desiring to promote the commercial purchase and sale of his patent. He might cooperate with anyone desiring to make use of it as a producer of kerosene appliances under his patents or to alter existing gasoline motor cars and boats to operate on kerosene. We have information that many motor car manufacturers are experimenting with these and other schemes; their interest has been aroused and pretty general adoption of kerosene equipment will follow as fast as the encouragement and assistance of related interests warrant.

We think it not impracticable for this association to help the user of one of these schemes directly by inducing garage men and repair shop people to convert existing machines by applying either or both of the above systems instead of requiring owners to buy new machines for the purpose—this would take too much time.

Of one fact I feel convinced today, that as the gravity of gasoline has been reduced from 70 to 60 within a decade and as gasolines of high boiling point are in successful use today, whereas they could not have been employed 5 years ago, it is only a question of time when motor cars must be so constructed as to permit of their starting with gasoline and of the continuance of their operation on kerosene, or perhaps a refinery product that will permit the manufacture of a vastly higher percentage of so-called gasoline from crude than is done today.

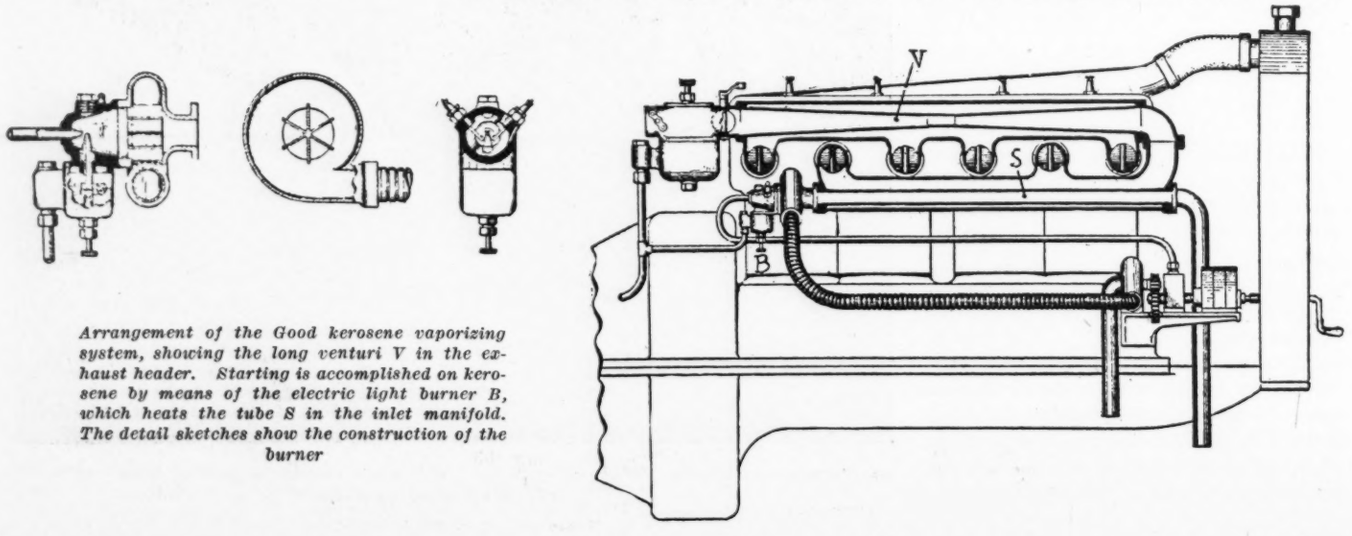
H. G. James does not think the gasoline producers are to be blamed for the high cost of gasoline, but rather are to be thanked that it is not higher. In regard to crude oil and its effect on the gasoline industry, he said:

There have been 79,312 wells drilled in the mid-continent field. Approximately 43,000 of these are now producing. If the developed production of the field is 380,000 barrels a day, then the average daily production of all the wells, including Cushing, Augusta and other gushers, is less than 9 barrels. The older the field grows and the larger the number of small wells, the higher the market price of crude must climb. I think it is safe to say that the average daily yield of at least 37,000 of the 43,000 producing wells in the field is from 2 to 3 barrels, so that the average of the 6,000 biggest wells in the field, including all the 2,000- to 10,000-barrel gushers, is less than 48 barrels a day, and this is based on a daily yield of 380,000 barrels.

My purpose is to show that the inevitable tendency must be toward a higher crude market and, therefore, a consistently higher gasoline market. In the eastern fields, where the oldest wells with the smallest output are, the crude market never gets below $2.25 a barrel any more, and most of the time it is above $2.50 a barrel. And in that territory gasoline prices are uniformly high. We may fume and insist that the eastern gasoline market should be the same as the western, plus freight; but it must be patent to any student of economics that just so long as it is necessary to maintain a $2.50 crude market to make it pay to pump thousands of stripper wells, just that long is this influence going to have a greater power in fixing the gasoline market than any local conditions that may obtain in the mid-continent field. And by the same manner of reasoning it is equally true that as the number of old wells of small caliber increases in the mid-continent field, with equal ratio the crude market will succeed to permanently higher levels.

There may be periods of overproduction, but I doubt very much if this field ever again sees 50-cent crude. I would more expect to see the dollar market the minimum line.

It is doubtful if the average oil man, to say nothing of the average consumer, fully realizes the remarkable evolution that has taken place in petroleum in the past 4 years. The total production of the United States has increased during that time from 222,935,044 barrels in 1912 to 301,000,000 barrels in 1915, an increase of 78,000,000 barrels, or 34.98 per cent, while the output of gasoline is at least five times as great as it was in 1912. This is a startling statement. It shows forcibly the efforts that refiners have made to meet the situation. And I want to go on record as saying that, no matter if there do appear to be exceptional profits in oil products just now, it is mightily to the credit of the oil



Arrangement of the Good kerosene vaporizing system, showing the long venturi V in the exhaust header. Starting is accomplished on kerosene by means of the electric light burner B, which heats the tube S in the inlet manifold. The detail sketches show the construction of the burner

fraternity that gasoline prices do not go higher. There was a great clatter and clamor about high prices a year ago and a federal investigation was held, but no evidence was adduced to incriminate the oil fraternity. The public has been, I might well say, wonderfully served. Gasoline in almost every turn in the road, never exorbitantly high, sometimes below cost, always a sufficient supply, and placed in the consumer's car while he sits in his comfortable seat puffing a clear Havana.

Let me ask you: Has any other industry with an increased demand for its product several hundred times as large as the increased supply of its raw material met the situation so promptly, with no inconvenience whatever to the public, rather increasing its service, and at the same time much of the while selling that product at a lower price than ever before? Today in the midst of a tremendous demand, the greatest ever known, gasoline is selling in Kansas City for 14.8 cents a gallon. And only 15 months ago it was selling in the same market for 7.8 cents a gallon. Kerosene is selling in many markets today for 5 and 6 cents a gallon. I am not surprised, therefore, that the Federal Trade Commission has not yet issued its report. It would not surprise me if the report had been delayed because of the inability of the commissioners to find suitable terms in which to congratulate the fraternity upon its excellent performance.

I cannot but feel it is more or less folly for us to waste our time in predicting the exhaustion of crude petroleum within any given limit. As far back as I can recall men have indulged in this form of speculation, and yet today we have more crude oil in sight than at any other time in the history of the business. Most of the time for years we have had a wasteful overproduction. It is estimated that Kansas, Oklahoma and the Gulf states have produced 960,000,000 barrels of petroleum and that these present fields, without further extensions, will undoubtedly produce 4,000,000,000 barrels more. I believe that the production of oil will continue indefinitely to meet demands. In addition to this in the mid-continent field we are averaging fully 100 per cent more gasoline from the same amount of crude than we did 3 years ago, and I believe that improvements in distillation and in refining processes generally will very largely increase this percentage, so that part of the increase in consumption will be taken care of in increased volume from the raw material. I know of one refinery that is getting more gasoline now from 5,000 barrels of crude a day than it got formerly from 17,000 barrels.

Sees Need of Chemical Experiment

And if I were to continue to enumerate the follies of 1916, I would say that possibly the chief mistake of this period has been the failure of the oil industry to delve thoroughly into the chemical possibilities of petroleum. Lately we have made wonderful strides. Through experimentation we have learned how to get larger percentages of gasoline from crude, and we have found we can make a better motor fuel of 57 or 58 gravity than we used to make of 60 gravity, and thereby increase the volume. But there is no doubt, in fact we know, there are many further possibilities in crude petroleum. I believe that millions upon millions of dollars are being wasted in oil that is being used today as a cheap fuel product. I am in favor of the introduction of the most aggressive policy in the conservation of this remarkably valuable mineral product. I do not agree with that class of men who believe the prices of gasoline have been too high. My theory is that gasoline has been too low.

Permit me to call your attention to the fact that, according to official reports, the average price of gasoline per gallon of about sixty of the largest and leading refineries in the United States in 1915, I think representing the general market, was 8.7 cents per gallon. I submit that no fair-minded person could ask the refiner to put gasoline on the market at a lower rate. According to the announcement of the Geological Survey, there were produced and marketed in this country last year 281,104,104 barrels of crude oil. If this crude distilled an average of 15 percent gasoline, and I am sure it averaged 30 per cent in the mid-continent field which produces 60 per cent of the country's supply, then our gasoline production in 1915 was 1,770,955,855 gallons, which, at 8.7 cents per gallon, returned the refiners $154,073,159. The average tank wagon price of gasoline throughout the country in 1915 was 11.15 cents per gallon, or $197,461,577. Understand this was gross. All the expenses of transportation, handling and profit had to be paid out of 2.4 cents per gallon. This fact is referred to Mr. Ford. The value of marketed crude in 1915 was $179,462,890, or an average of 63.8 cents per barrel. The value of the total output of petroleum in the United States in 1914 was $214,125,215, and it is not unlikely when the value of the entire field in 1915 is computed it will reach upward of $225,000,000. This means that the petroleum production of the United States in 1915 was twice the value of iron ore shipments, more than twice the value of the gold output of 1915, almost six times the total valuation of silver in that year and practically an even competitor of copper. The total value of our manufactured articles in 1915 exceeded $26,000,000,000. Our agricultural products last year were valued at over $10,000,000,000. I simply mention these figures to show the relative importance of oil which was an unknown quantity 60 years ago.

Another of our follies is this talk of standardization of gasoline. Let us ask you: Of what earthly use would any law of this character have been last winter and spring when it was not a question of quality, but quantity? When gasoline becomes scarce, everybody is going to get busy "lengthening the supply," regardless of law. When there is enough gasoline there is no need of regulating measures; when there is not enough, no law can be made effective.

On the other hand, a general gasoline specification is impracticable. The proposition is a twin sister to the common carrier law. The great variation in crude oil makes almost impossible workable specifications for either gasoline or neutral oils. For instance, there is almost 4 degrees gravity difference between gasoline made from Pennsylvania and western petroleum. A 58 gravity gasoline made from Oklahoma or Kansas crude might prove perfectly acceptable, while if made from Pennsylvania crude would not suffice at all. Again there would be a material difference in gasoline made from Healdton, Cushing, Bartlesville, Chanute or Augusta crude. Each has its own characteristics and intrinsic value along certain lines. One gasoline with 400 end point might be much inferior to another of the same end point, so that if the law did specify the end point, its requirement would not always guarantee the quality.

What I have said of gasoline specifications would hold true regarding neutral oils. A 200 viscocity neutral oil made from Pennsylvania crude averages from 31 to 32 gravity, but if made from western crude it averages about 5 degrees heavier for the same viscosity, and while it is 5 degrees heavier in gravity, it has also a lower flash in fire test. It would be necessary to have specifications for each grade of crude, or else use mixed crudes, and that would mean a great refining loss. There would be such a tangle and confusion with so little benefit to the public that it would not be worth while. Officials better direct their attention toward a solution of the kerosene and fuel oil questions—how to convert them into motor fuel. I contend that, so long as it is practically known that this can be done if the mechanical apparatus can be devised and in view of the oft-repeated assertion that our supply of petroleum is destined to be exhausted in 27 years and again in view of the astonishingly rapidly increasing demand for gasoline, it is little short of criminal to use these valuable products for cheap fuel. I insist that it should not be so much the concern how cheaply gasoline can be sold, but rather how far its supply can be made to go, and how well we can conserve the raw material.

SCHULZ IS MERCER ENGINEER

Trenton, N. J., Oct. 30—A. C. Schulz has been appointed chief engineer for the Mercer Automobile Co., Trenton, N. J. Mr. Schulz was connected with the Locomobile Co. of America as assistant chief engineer for 14 years prior to this change.

A Correction

In the first paragraph of a story concerning Charles Henry Davis, president of the National Highway Association, which appeared in the August 31 issue of Motor Age, it was stated he never sought subscriptions for road work. This was incorrect, since he has raised much money by subscription.

CAR SHORTAGE HITS SOUTHERN TRADE

St. Louis, Mo., Oct. 30—The car shortage is hitting the motor car trade in a peculiar way in the south. In southern points it is almost impossible to get box cars, which seem to be centered at port cities. So distributors from Atlanta, Memphis, Birmingham and other southern cities are shipping motor cars on flat, or open, cars, sending a watchman with each car. Freight cars for local freight use are so scarce in St. Louis local distributors are paying the fare of the customer to St. Louis and supplying a chauffeur to drive him home. This service extends to sales within 200 miles. Nearby sub-dealers come after their cars. The same practice is true in Memphis.

MONROE INCREASES CAPITAL

Detroit, Mich., Oct. 27—The Monroe Motor Car Co., Pontiac, Mich., has increased its capital from $250,000 to $1,000,000. New officers were elected at a directors' meeting held October 24 and include R. F. Monroe, president and general manager; S. W. McFarland, secretary and treasurer; S. S. Jenks, vice-president and manufacturing manager.

The company plans to utilize its Port Huron plant for the construction of motors until some time in the future, when the plant will be moved to Pontiac. The Monroe company, which opened its plant in August, 1914, making its first delivery January, 1915, has heretofore been selling its product through the Chevrolet company, of Flint. It will sell its cars directly in the future. The company made 3,500 small roadsters in the last year and plans to turn out approximately 7,000 cars during the coming 12 months, which will include 2,000 small roadsters with roadster, cloverleaf or sedan bodies and 5,000 4-cylinder touring cars with either touring or cloverleaf bodies. Their prices will be $565 for the present roadsters, $635 for the cloverleaf roadsters, $965 for the sedan, $985 for the new touring cars with either touring or cloverleaf bodies.

STUTZ ROADSTER $2,275

Chicago, Oct. 31—The price of the Stutz roadster is $2.275 instead of $2,550, as given in the Stutz Motor Car Co.'s ad in the October 26 issue of Motor Age.

OWNER TELLS PARKING TROUBLES

St. Paul, Minn., Oct. 30—The new city parking ordinance has brought out the story of one car owner's experiences since he bought his car July 1 of this year. July 3 someone took a pair of blankets costing $22. August 30 his machine was run into by a backing car while at the curb; the repairs cost $7.40. October 10 boys climbed over the car, while it was parked, to watch a newspaper score board, and the paint bill was $30. At $1 an hour he spent a lot of money trying to start his engine after it had stood in the cold, he figures. The total cost from lack of parking facilities was $65.40. Had a garage been available for parking in the same period he would have saved $25.40. The new ordinance will relieve his troubles.

CHALMERS CO. MAY RECAPITALIZE

Detroit, Mich., Oct. 31—J. S. Bache & Co. and C. D. Barney & Co., both New York City stock brokers, have under consideration a plan for re-financing the Chalmers Co. Details are not yet definitely determined, but it is planned to increase the working capital by $5,000,000.

Advocates National Traffic Body

Would Have Committee Work Towards Uniformity of Regulations

MILWAUKEE, Wis.—Editor Motor Age—Motor Age is to be commended on its campaign for a standardized traffic code and I hope and believe it will see it through to a successful conclusion. City newspapers are always starting campaigns for one thing or another, which either fizzle out in a few days or are dragged out with a rehash of words until they become a bore with apparently little results, but I do not believe either case will be true of Motor Age. Discussion and work, organized work, are what will be required to get results. These are the two underlying factors that have made the S. A. E. such a factor through its standards committee.

Motor Age has started discussion, but only a portion of the work involved can be done from the editor's desk or anyone's else desk. I suggest that Motor Age have its best men of both its New York and Chicago offices appear before the organizations which can exert strong influences in the right direction and to get not only their pledges of support but for action. There are thousands of societies of this kind but it would be nearly impossible to reach them all directly without a large expenditure of time and money. It is fortunate, however, that in almost all cases these smaller organizations are banded together in more or less closely knit national organizations.

It is these national bodies, then, that should be induced to stir into action their constituent parts throughout the country. Of this class the first to come to mind is the A. A. A., whose organization of individual clubs, state associations, with their own publications, and strong central body is ideal for the purpose.

Another suggestion has been made by one of your correspondents, namely the National Chamber of Commerce, spoken of by C. F. Dunn. I am not sure that the various Safety First societies have a national organization, but if not I think that they look to the New York society for inspiration since many of the local bodies were formed a few years ago through the efforts of Mr. Elliott, the public spirited secretary of that society. Again I am not sure about the organization of the chiefs of police, but I do know that there are state associations of these officers, for the Wisconsin body recently met in this city and discussed traffic codes and headlight dimmers. Between the lines of the letter from H. Jacobs is also the suggestion that the various leading highway associations might lend a hand.

If a few public-spirited moneyed enthusiasts would band together into a society or committee for standardizing traffic rules and finance a secretary and publicity bureau there would be great hopes of real accomplishment. The duties of such a secretary would not be to deal directly with the city councils and police departments, but to stir up, and keep stirred up, the national bodies already mentioned and in the large cities such local organizations as city clubs, merchants and manufacturers' leagues, etc., which can bring to bear so much local pressure, if they are only kept at it. The car manufacturers approved of a standard code at the recent meeting of the N. A. C. C. shows that they appreciated the good that would come to the industry from such a move and it seems more than possible that the N. A. C. C. would lend financial aid to a secretary and publicity work as suggested.

About half of the letters which you have published relative to the standardized traffic code have been merely in support of your campaign. I do not believe that there is a single person who has ever driven a car in more than one city who does not realize the present chaos of rules and will commend your action. I suggest, therefore, that those who write you in the future assume that you understand that they are with you and take the space for a discussion of specific conditions and the Eno plan. Otherwise Motor Age is going to find itself saddled with a dead page, which will soon be "passed up" by its readers as the weeks go by.

In the note following Section 2 of Article 1 of the Eno ordinance it says: "No traffic regulation should be more drastic than is absolutely necessary to insure reasonable safety." That is assuredly the right attitude, but I certainly do not believe in the rest of the note, of which the above is a part. It seems to me that the times when a motor vehicle may reasonably pass a street car on the left are so very rare as to be negligible and I would strike out the last three words of Section 2, which say to pass to the right of the street car "if space permits." If the rule is so loosely drawn as it stands there will be scooting around street cars on the left on the slightest provocation, and I know of no more dangerous practice, particularly with near-side stops. Assume that a car is taking on a big load of passengers and a motor car wishes to cross in front of it, having approached from the right. The motorman will often signal the driver to cross, as he knows that he will not start for a minute or so. The driver proceeds and just as his hood passes beyond the street car he is hit by another car which is passing on the left side of the street car because "space did not permit" passing on the right, due to the people boarding the car.

So many accidents happened in Detroit about 5 years ago from motor cars passing on the left side of street cars that for the last few years it is the one rule the violation of which the police absolutely will not stand for and the Detroit police are fairly reasonable. I do not believe in having to wait behind every street car which is stopped for passengers if there is safe space for passing, but I do believe in waiting rather than passing on the wrong side.

With left hand drive there seems to be a tendency for motorists to take the middle or even the left hand side of the street. This, of course, is in violation of the Eno and all other traffic ordinances. On the other hand, driving too close to the curb is also dangerous because so many people take one step off the curb before looking for traffic. The Eno rules cannot be improved on this subject, but Motor Age might call the attention of its readers to these two bad practices.

In Article 7 the Eno rules prohibit the use of vehicles under certain conditions of load, etc. It is a good provision, but it seems as if there also should be a clause about special police permits, which would allow some of these loads to be moved at certain hours of the day or night and under certain conditions of supervision. I am thinking of the transportation of building and bridge trusses, etc.

In Section 5, Article 7, it says that a machine shall not be left standing with the engine running unless in charge of the operator. I would change the words "the operator" to "an operator" so that the clause might not be more drastic than necessary for if any friend leaves the wheel to go into a store, keeping the engine running, and I sit in the driver's seat while he is gone the public is just as much safeguarded as if I were the operator.

I am entirely at a loss to know the meaning of Section 8 of the same article, which says: "Coasting is prohibited when dangerous." Does this refer to throwing out the clutch or killing the engine and coasting or does it apply to winter coasting with

Would Add Some Points

GRAND ISLAND, Neb.—Editor Motor Age—Your traffic regulations have been given careful consideration and I will say that the ideas contained therein are up-to-the-minute in every respect. However, several additions could be made, among them and the most important being that of speeding. No regulations, no matter how rigid, can be carried out successfully unless the speed is suppressed.

Our city has adopted all of the regulations mentioned in your suggested ordinance and has found that they work out very successfully and that the problem of heavy traffic is solved.—T. M. Hansen, Secretary, Grand Island Commercial Club.

sleds and bobs? If it means the first, as it seems to, I should like to learn under what conditions coasting is so dangerous as to demand a special section in the ordinance.

As there is no clause in the Eno code relative to accidents, I think one could well be added defining the driver's duties as to stopping, giving aid, etc. Along the same line it should be required by law that any passing car must take an injured person to a hospital when requested to do so by an officer.

There are several conditions of city driving that are not covered by the Eno ordinance, which I think every one would like to have standardized, such as the position in the street of the traffic officer, the method of passing the officer, and rules for turning corners to the right and left. I have had a chance to study by experience the traffic rules of Detroit and Milwaukee and they differ on each of the points mentioned. The Detroit officers stand as near the center pivotal point as possible with one stream of traffic passing behind them, while in Milwaukee they stand too near the curb to go behind them and so far out that one often has to swing on to the car tracks in order to pass in front of them. This position in itself, together with the non-uniformity between cities, I believe to have been largely the cause of the killing of a Milwaukee officer recently by an out of town driver.

At street intersections in Detroit one can always turn to the right into the cross street without a special signal from the officer but must draw up beside him and wait for him to change the direction of traffic before turning into the street to the left. In Milwaukee one cuts across his own line of moving traffic when turning into a street to the left—that is, one tries to do so but nobody seems to want to let him through. It is simply a case of scrambling through as best one can with from two to three close shaves each time. On the other hand to turn around the corner to the right requires waiting until the direction of traffic is changed, which seems entirely unnecessary as this turn is always safe if due regard is given to the pedestrians on the cross walk.—Herbert L. Connell.

Cleveland Automobile Club Comments on Eno System

CLEVELAND, O.—Editor Motor Age—Undoubtedly there is urgent need for adopting a uniform system of traffic regulation. There are no two ways of looking at the question. While local conditions affect regulations of minor matters, there is an obvious necessity of standardizing signals and general practices.

We have read Mr. Eno's suggestions with interest and believe they can, in a general way, be made the basis of a uniform system. So far as Cleveland is concerned, most of these are already in effect and have been for some time. Let us take these up in the order in which they are given in Motor Age of September 28.

Parking: On streets which are wide enough, such as Superior avenue, the parking system is used. On others, cars are ranked. Stopping with the left side of the vehicle to the curb is prohibited and fire hydrants and cross-walks are protected. We have no one-way streets in Cleveland. The rotary system is now to be tried out in the public square. At intersections, a vehicle going north or south is stopped while traffic is going east and west. If a driver desires to make a turn to the right, he can do so, joining in the stream of traffic moving in that direction. We believe Cleveland is one of the first cities in the country to permit this. Vehicles desiring to cross in the opposite direction are required to pull beyond the middle of the intersection. Passing street cars on the left has been prohibited for years. Signals are required by extending the arm when about to stop or turn.

The block system has not yet been used here, but it is being looked into. Because of the length of the blocks in Cleveland, it has been considered of doubtful value, but if investigation proves that it is practicable for Cleveland, our progressive regulators of traffic will undoubtedly incorporate it.

Safety zones have been established in Cleveland for several years. Posts and chains are used. There is an ordinance requiring pedestrians to cross at designated cross-walks and on signal of the traffic officer. We believe Cleveland was the first city in the country to try out semaphore or automatic signals suspended above the street, inasmuch as the devices were invented here. I have come to the conclusion, however, that nothing can take the place of the human officer in the middle of the street.

Cleveland has a mounted squad which does splendid duty in keeping an eye over considerable areas. The men on fixed posts at intersections now use hand-operated signs.

In the Eno traffic ordinance proper, I would take exception to paragraph D:

"The following regulations for vehicles shall be observed by the drivers thereof, who shall also comply at all times with any direction by voice, hand or whistle from any member of the police force as to starting, stopping, slowing, approaching or departing from any place, the manner of taking up or setting down passengers, and the unloading or loading of anything."

An ordinance almost identical in wording was recently introduced in the city council and was killed because it was considered too drastic in giving all members of the police force—whether or not in uniform—czar-like powers. Furthermore, we do not believe it is consitutional. Certainly, we believe it impossible to delegate the interpretation of whether or not any act shall be an offense to a police officer. We believe any law must specifically describe the act which shall be an offense.

The basic features of the ordinance, such as passing vehicles going in an opposite direction on the right, passing vehicles going in the same direction on the left, slowly moving vehicles keeping to the right, etc., are of course covered in the Cleveland ordinance. One or two knotty problems have been dealt with here in an extremely successful manner. Leading among these is that of glaring headlights. The Cleveland ordinance reads as follows:

"No person shall drive or propel any automobile, motorcycle or other vehicle, nor shall the owner thereof while riding thereon or therein allow any such vehicle to be driven upon or over the streets of the city at the time lights are required to be carried by section 1341-28 of the revised ordinances of the city of Cleveland, if the said vehicle is equipped with a lighting device which concentrates and projects any part of the light into a beam, unless the said lighting device is so adjusted that at a point a distance of seventy-five or more feet in front of the said vehicle no part of the reflected beams of light from said lighting device shall be visible more than three feet above the surface of the roadway."

You will note that this ordinance does not require dimming, but rather deflection of as much light as may be necessary on to the roadway. This ordinance has been approved as practically standard, by the Society of Automobile Engineers.

There is also an ordinance covering lights on horse-drawn vehicles.

Among the new legislation recently added were ordinances prohibiting the operation of any gasoline vehicle without a muffler, including motorcycles; hitching behind; the use of any truck of greater than 1½-ton capacity, with tires having less than ½-inch rubber above the flange.—The Cleveland Automobile Club.

Makes Use of Ideas

PERU, Ind.—Editor Motor Age—I have read your initial article on "Standardizing Traffic Rules" and it comes to hand at a very opportune time, for we are just now engaged in an effort to devise a practical traffic ordinance which will be effective in regulating the traffic on the streets of Peru.

The necessity for a standard of traffic regulation is obvious. It is manifestly impossible for the motor tourist to comply with the traffic regulations in each city through which he may pass, unless our local ordinances may be drawn along similar lines and provide for the same general standard of regulation.

Your attempt to devise a standard basis for traffic regulations is commendable and will be carefully watched by those who are interested in this problem.—H. E. Hershey, Secretary, Peru Chamber of Commerce.

Regulation by States

MARSHALLTOWN, Ia.—Editor Motor Age—The rules for handling traffic which appeared in the September 28 issue of Motor Age are all right, but I think the whole scheme of city regulation by ordinance wrong. If you are to get uniform traffic regulations, get it by states and not by cities.

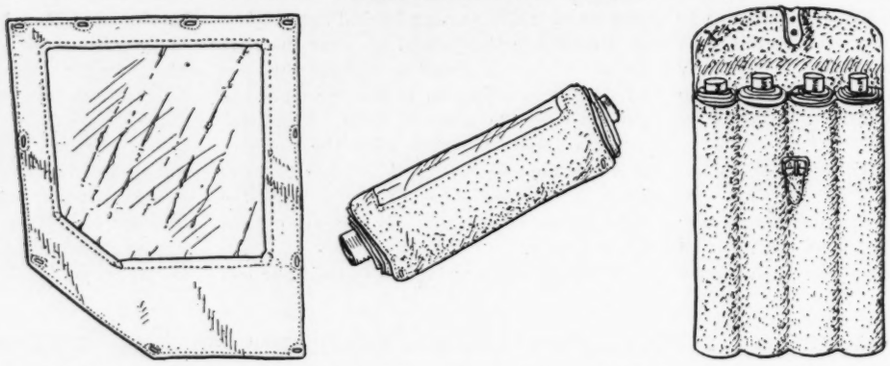
Iowa's legislature has been wise in reserving to itself the regulation of motor traffic except allowing cities to regulate speed down to as low as 10 miles per hour.

Iowa's legislature has made some bad blunders in the motor law, to-wit: In making numbers last for 3 years, so that after the first year the collection of the second and third year is left to some one official; in not making an exception of a street car in passing vehicles on the left; in not clearly giving right of way at intersections to those upon the right. As a whole it is a good law, and with slight changes as indicated much better than having a different ordinance in every town. Some days in 2 hours I drive through five or more towns. Suppose I was required to know city ordinances in all of them.

Many Iowa cities are passing and when they can inforcing absolutely void ordinances regulating motor traffic. It only needs someone who knows the law, and sand to stand on his rights, to set them aside.—A. A. Moore, chairman traffic committe, Marshalltown County Motor Club.

Winter and the Side Curtains

Timely Preparations to Make Top Equipment Weather the Cold



Left—Effect on side curtains of improper storage. Center—Side curtain wrapped around mailing tube. Right—Leather container for storing rolled side curtains

By Wallace B. Blood

DO you start boldly into the winter season, after a summer and fall of sunshine with the resultant non-use of top and side curtains, without giving these cold weather necessities a thorough going over? Do you wait for the first blizzard to haul out your side curtains? If you find them cracked and stiff and torn, blame yourself for not attending to them.

In the later models it is almost universal practice to carry the curtains within some kind of a pocket or container within the top itself. Such curtains will generally go through a summer without great deterioration. Not so the curtains which are rolled up and stored away in the tool box. The combination of dust, grease and varying temperatures, makes a bad looking mess of curtains which have not been properly stored.

If the micas are cracked, they should surely be replaced. If only covered with dirt and grease, they can readily be cleaned with vinegar, weakened with water about 50 per cent. In this cleaning process keep the vinegar away from the curtain material. It is very liable to discolor it. The curtain material itself can be cleaned with pure soap and water and brought back to its original color and softness with an application of neats-foot oil.

If the curtain material is torn it is a very easy matter to sew up the tear and make a passable looking job of it. If the fasteners have become torn out, however, the repair should include a leather patch. Very likely this fastener tore out because of the fact that deterioration had weakened the curtain material, and a mere sewing up is not going to be a permanent remedy.

Method of Storing Curtains

Once repaired, the curtains should be stored away so that they will not get into poor condition again, and an easy way to do this is to make or have made a simple leather carrying case such as is shown in the illustration. Any harness maker or manufacturer of leather goods can make this up for you for a dollar or so. The curtain may be rolled around an ordinary mailing tube or a round stick of wood, possibly a cut off piece of a curtain pole.

A top made of cheap material is indeed a bugbear after a few seasons of use. It is next to impossible to keep the material pliable and free from cracks and breaks. The life of the covering can be prolonged, however, if it is given a thorough treatment in the fall and spring. One way is to clean the covering with soap and water and rub neats-foot oil into it.

Still a better way is to paint it, after cleaning, with one of the preparations for that purpose which may be found on the market. There are several excellent top dressings available which will not only bring the material back to its original black, but will create a preservative coat which will give the top a new term of life. The same dressing will also serve well in renewing the finish of the side curtains.

It has been the plea of car manufacturers since the days that tops first became standard equipment that the owner give some regard to the method of folding the top and avoid squeezing the cover between the bows. This is still being rampantly disregarded and the owners are still buying new top covers. It is surely an easy matter to tuck the cover material back from between the bows when the top is put down. No matter how tight the clamps may hold the top down the vibration from driving will chew away on the material folded between the bows until it is worn through.

Once there is a hole or a tear through the top covering a repair that will not leak is a difficult proposition. The writer has seen ragged tears sewn closely with course thread and the repaired portion covered over, inside and outside, with rubber cement. How permanent this repair proved to be we cannot state, but it looked good on the face of it. Holes have been sealed successfully with a tire patch thoroughly cemented on over the top of the whole. Such things are not beautiful, in fact, any repair that will hold water is bound to be more or less bungly. A new cover and then a fair amount of care, charging the price of the new cover to your own education, is the best way out of it.

EMPIRE MAKES 6-TON AXLE

The Empire Axle Co., Dunkirk, N. Y., has been manufacturing 5 and 6-ton worm-driven axles for over 2½ years, these units having been incorporated in the trucks of the Hurlburt Motor Truck Co., New York City; Schafer-Decker Co., Rochester, N. Y., Bessemer Motor Truck Co., Grove City, Pa., and others. This statement is made as a correction of statements made in earlier issues that two other axle concerns were earlier producers of large capacity worm-driven axles.

Attention also is called to the fact in the Empire 1-ton worm-driven non-differential axle, described in the issue of October 12, the axle housing is constructed in three pieces which is regular practice in all Empire axles. The housing is so designed that all mechanism runs in an oil bath and no grease cups are necessary, as the brake shafts are oiled internally.

BRIDGE ST. MARY'S RIVER

Atlanta, Ga., Oct. 27—Special telegram—According to the Carlton County Chamber of Commerce, the contract has been let for the construction of a 60-foot steel span across the St. Mary's River, near Folkston, Charlton county, at the boundary line between Georgia and Florida and the state connecting point on the Dixie highway.

This division of the Dixie highway is known as the central route. The construction of the Folkston bridge will make it a ferryless route from Atlanta to Savannah and will shorten the time record.

The bridge will cost $3,494. It will have a 95-foot wooden approach on each side.

Truck Bullseyes

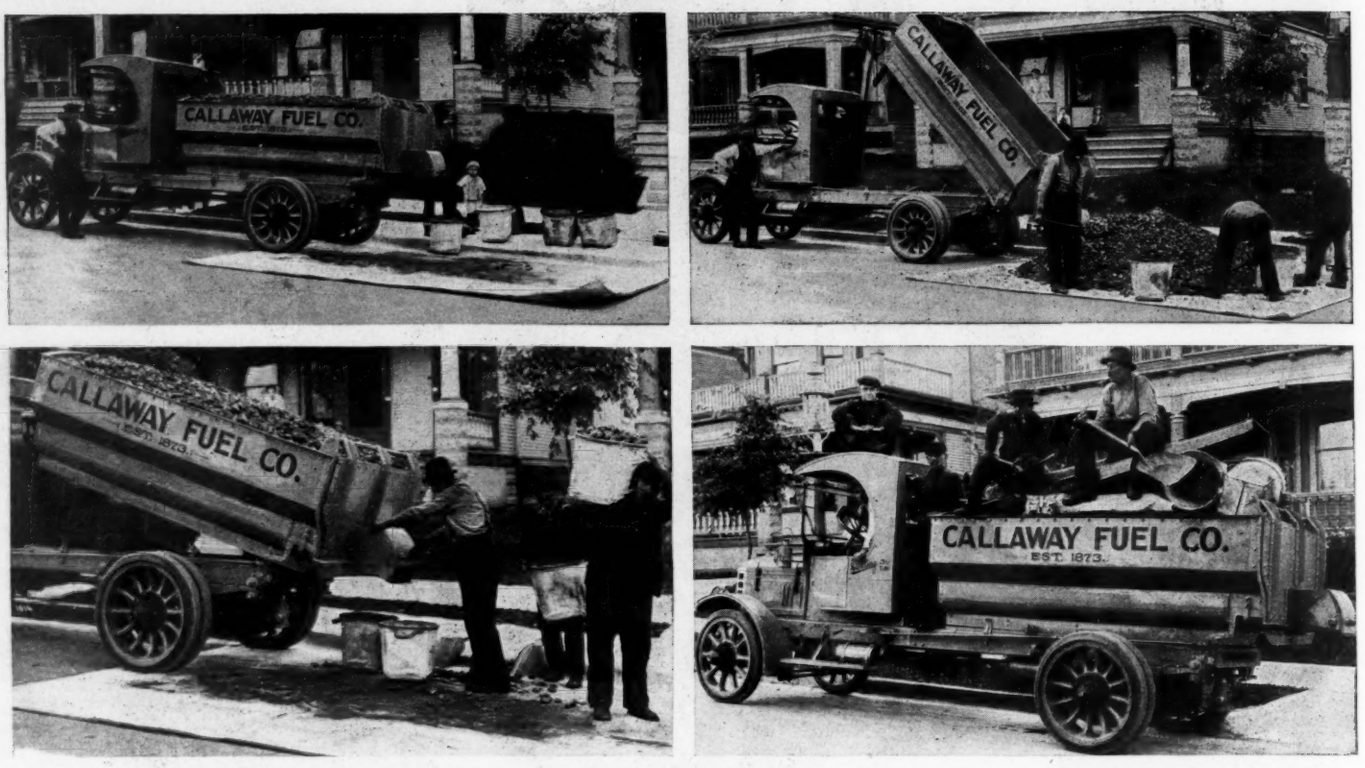
By W. K. Gibbs

EVERY day brings to notice gigantic tasks performed by motor trucks that less than a score of years ago would have seemed impossible. Once the exact ratio between horse and motor truck hauling seems to have been established, along comes some additional feat performance by trucks and tractors that so entirely eclipses previous performance that there is no comparison. One might apply the term "ambidextrous" to the truck without fear of contradiction, for the part which motor trucks play in all lines of commerce and industry is very diversified. We have made a casual survey of the industry and picked out some of the highlights in truck performance. We believe these to be fairly indicative of what trucks of the present type can do. A few years hence these brief stories of what trucks are doing may appear most commonplace when the light of comparison is thrown on them and the performance of motor trucks of, say a half decade in the future.

Old Dobbin is fast being relegated to green pastures and in his place comes the iron horse that knows no fatigue, has no nerves and does not require sleep. Incidents of continuous work are told in the stories that follow and when the balance sheet of the motor truck user is footed up at the end of the month he finds that he has done more work at a materially smaller expense than he ever did with horse-drawn equipment.

Moves 35 Tons of Coal Daily

SPECIAL bodies plus good business management make it possible to gain surprising results with motor trucks and as an evidence of this, attention is called to the equipment of the Callaway Coal Co., Milwaukee, Wis., which consists of a 3½-ton Sterling truck with a special unloading attachment. The truck is loaded from overhead hoppers and proceeds with its load and the helpers to the consumer's premises. It may be that the consumer requires only 500 to 1,000 pounds of fuel. In this case, canvas bags of 100-pound capacity are filled from the flour-bin type of chute at the rear end of the body, the hydraulic hoist tilting the load sufficiently for the fuel to flow easily. In the event that the bulk load is to be delivered, a tarpaulin is spread on the pavement and the entire load dumped, the truck immediately proceeding to the loading point and the helpers being left behind to put the coal in the premises. In case of a concentrated business district where there is a side or rear alley and a number of deliveries are to be made in the same neighborhood, the helpers after putting in the coal, walk to the next place of delivery,



Four views of the Sterling truck in the service of the Callaway Coal Co., Milwaukee, Wis. The upper left shows the load ready for delivery by canvas buckets. Upper right is the load being dumped to allow truck to go after another load. Lower left is shown special unloading device, and lower right picking up men for return to yards at end of the day

the address of which has been given them by the driver from his routing card.

It is not always practical to route the loads so as to avoid considerable detour mileage each day to pick up the helpers, and street cars have to be relied on to get the helpers from one delivery to another. Even with the non-productive time in picking up, the method has proved far superior to the horse and wagon system, or keeping the truck idle while the load is being removed. If the truck stands idle while the coal is being put into the premises not much more than 50 per cent of the operating day is productive. This outfit, as shown in the illustrations, has delivered more than 35 tons of coal a day. With the use of the tarpaulin the consumer's walk is not blackened and there is no waste.

Trucking Garden Stuff Profitable Business

TRUCK farming is an acknowledged money-making proposition, but hauling garden produce to market may be made quite as profitable. This has been proven by Joseph B. Owen, Clarksboro, N. J., who resigned as conductor on the Pennsylvania railroad, bought a 1½- and a 3-ton White truck and began hauling his neighbors' crops to the Philadelphia market.

His trucks work 7 days a week and always carry full loads. In addition to hauling crops he finds use for them otherwise, especially during the winter. Mr. Owen has found that his neighbors who own horses would rather pay him for hauling their produce to market than put their teams on the road in hot weather.

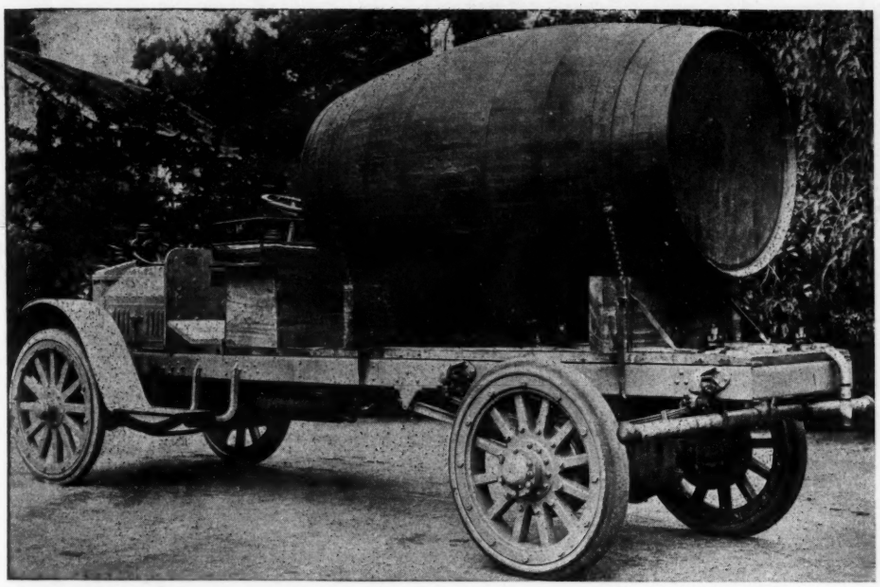
Owen has made a rule that the farmers must bring their produce to him. Occasionally he will go several miles to get a full load, but not for less. He operates his trucks on a regular schedule, the farmers bringing their produce to specific points or stations and in sufficient quantities to warrant collecting with the trucks. He leaves Clarksboro in the afternoon at 4:30 o'clock, loads at the supply stations, crosses the Gloucester ferry and reaches Philadelphia markets at 8 o'clock.

During the asparagus season the trucks haul from 200 to 500 crates a day, but as the season advances, tomatoes, peaches, lima beans, peas, sugar corn, cantaloupe and other produce is carried. He makes a charge of 6 cents a basket for hauling tomatoes and the trucks average from 1,000 to 1,200 baskets a day. The re-road for one day with his trucks is 1,400 baskets. The trucks earn over $60 a day for their owner during the busy seasons and have paid for themselves many times over.

Makes Cleveland's New Bridge Possible

FORTY-FOUR White motor trucks, working for eight different contractors or building material companies, have hauled over 60 per cent of the thousands of tons of materials used in the construction of Cleveland's new $4,000,000 high-level bridge. This structure is the longest double-decked, three-hinged, steel-arch bridge in the world and when completed will connect the west side of Cleveland and its 300,000 population, in direct communication with the downtown district.

White truck which Jerseyite uses to haul his neighbors' produce to Philadelphia market. This truck earns over $60 a day in the busy season



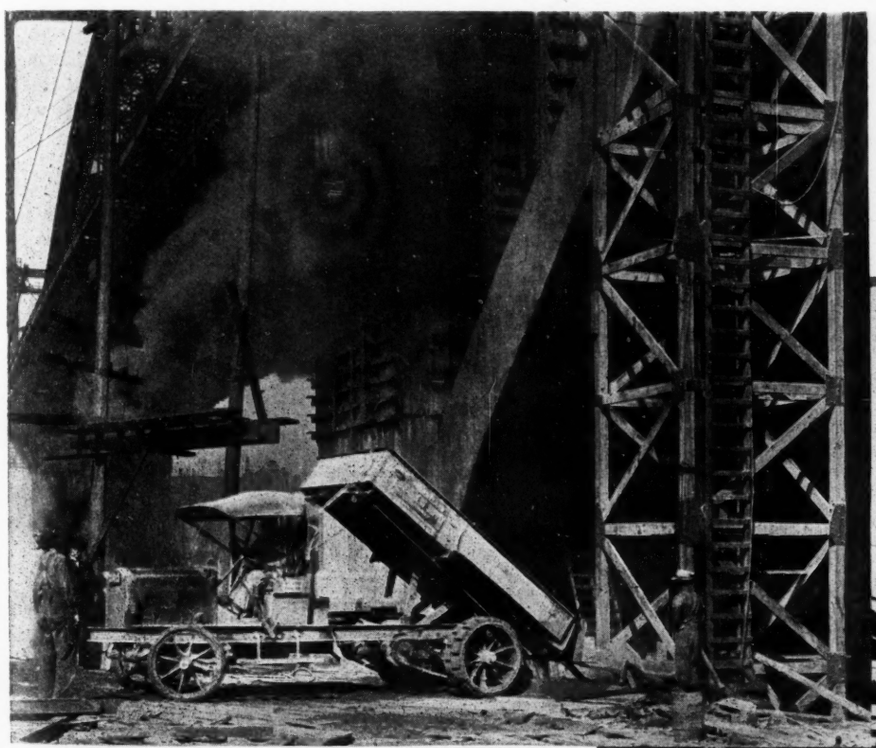
Bombay, India, has a water wagon. The truck is a Federal

Work on this project began in May, 1912, and a part of the bridge will be opened this month, although it will not be complete until late in 1917.

ment, sand, gravel, slag and limestone to the mixers and after it had been mixed, re-hauled it to the forms. The speed of the trucks was important, because they offered the only means of transportation that enabled the contractors to secure the materials in sufficient quantities to keep the mixers busy. In hauling the mixed concrete to the forms all the units of the job had to be poured continuously and it was absolutely necessary that the handling be done by dependable equipment, as a breakdown in the middle of the job would have entailed heavy financial loss to the builders.

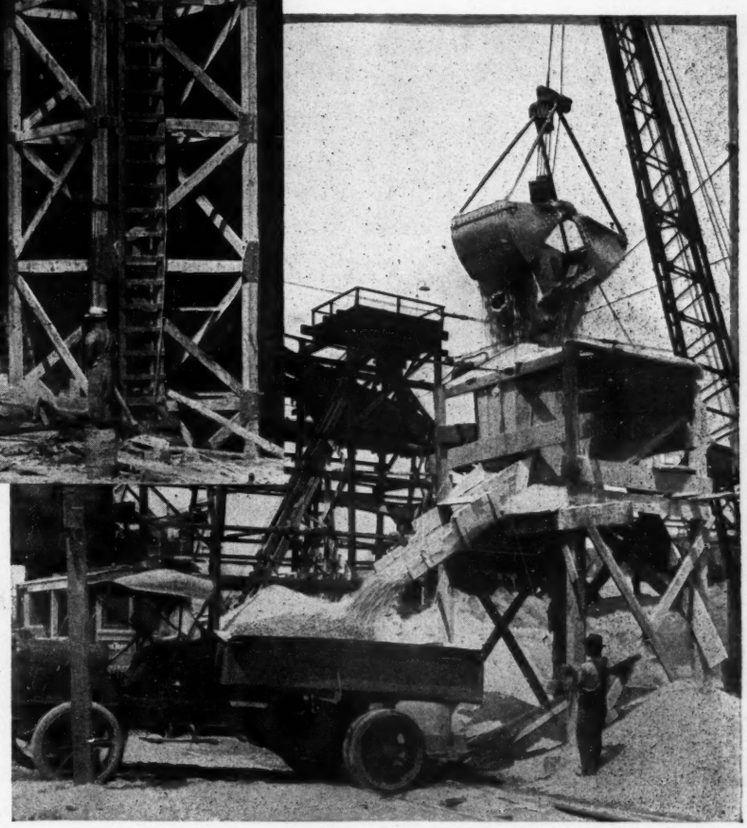
To give some idea of the enormous quantity of material used in the construction of the bridge it might be said that it would require a train 75 miles long to carry it and if hauled in motor trucks, would require a line of approximately 26,000 trucks.

The trucks were loaded at the mixers by means of a clam shell bucket as shown in one of the illustrations. The White trucks used in hauling material moved 543,000 sacks of cement, 62,692 tons of sand, 15,653 tons of limestone, 108,900 cubic yards of mixed concrete and several thousand cubic yards of slag besides tons of miscellaneous materials, tools and other supplies. Some of the material was hauled over a mile course, the trucks crossing two draw bridges, a railroad and climbed Detroit avenue hill with a 12 per cent grade. One truck made thirty-five trips in 10 hours.



One of the White trucks dumping concrete at the lift in Cleveland's high-level bridge construction

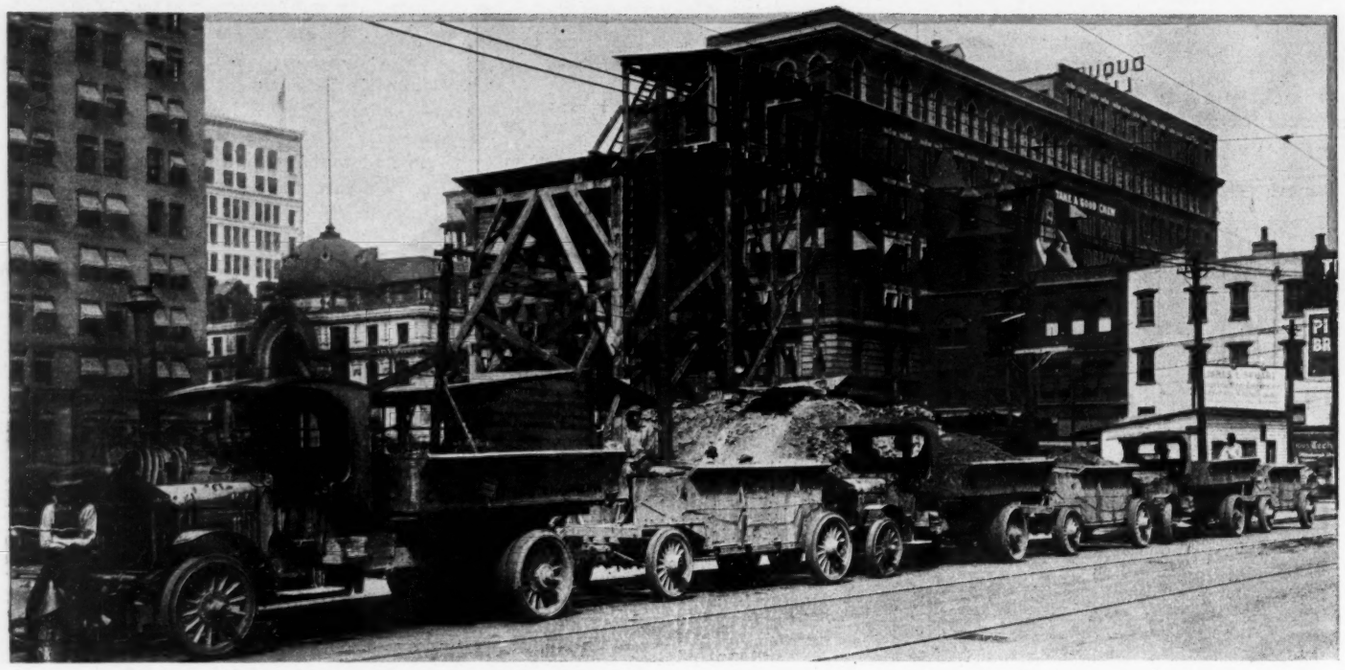
The cost of tackling this job without the use of motor trucks would have been so high as to be almost prohibitive, according to the engineers, since it was estimated that in certain phases of haulage work one truck could make four trips to a team's one, hauling 24 tons of material while a team could haul but 3 tons. The trucks performed a double duty in hauling the concrete work. First they hauled the ce-



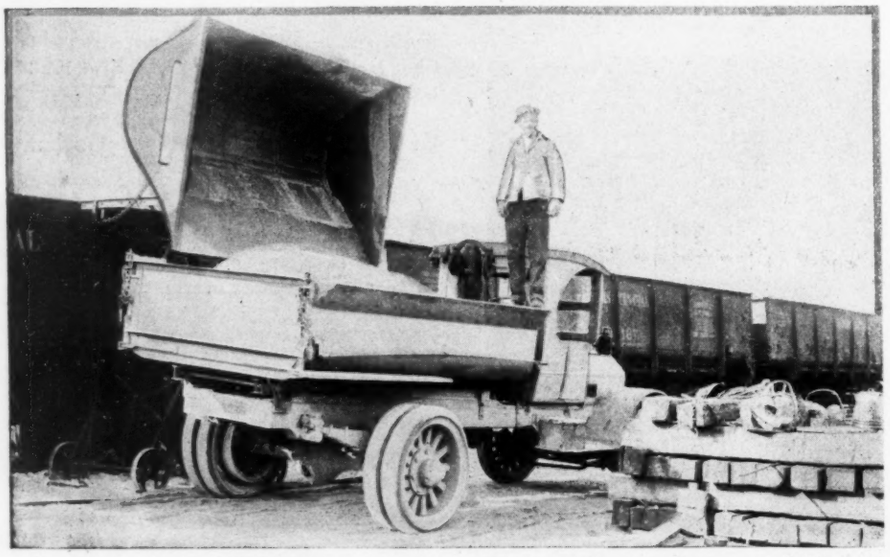
This is how the mixed concrete is loaded on to the White truck in the construction of Cleveland's new bridge

Garfords Help Build Gotham Subway

A FLEET of Garford trucks are doing yeoman duty in the construction of subways in New York. These trucks, in the service of subway contractors, are prov-



Pierce-Arrow fleet of 5-tonners which, in 60 days, have moved 75,000 cubic yards of earth, rock and limestone in the excavation for the William Penn Hotel, Pittsburgh's newest hostelry. The trucks operated day and night

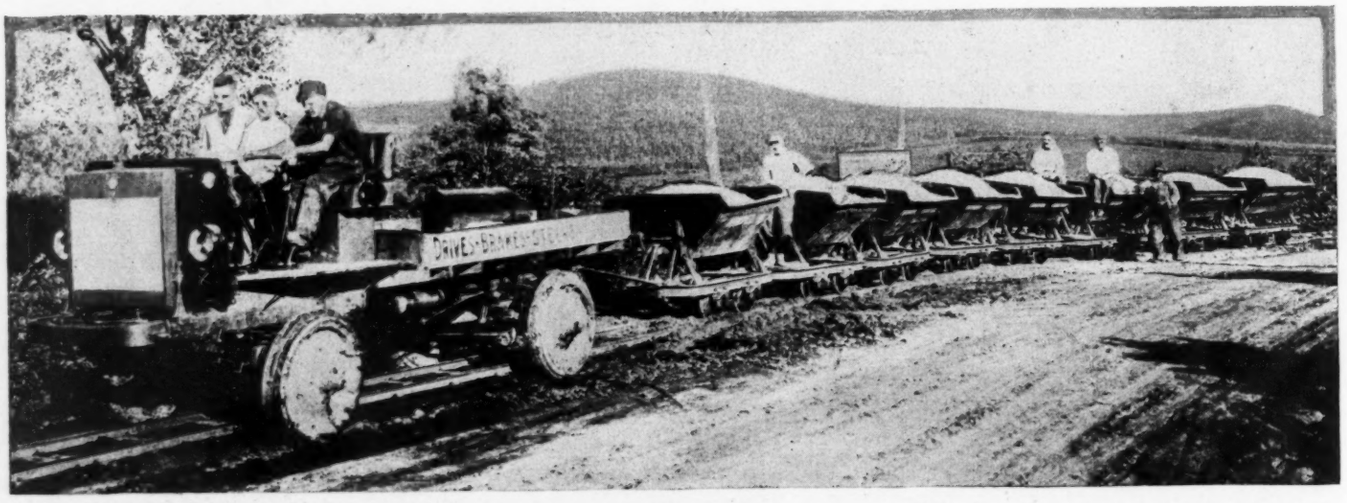


Harvey 5-ton truck being loaded with paving material. It makes nineteen round trips daily of 3½ miles, hauling 5 tons to a load

ing their efficiency and equipped with Troy trailers are moving thousands of cubic yards of earth to the scows in the river which take the material to the disposal station. Two photographs on page 39 of this article show the special loading and unloading equipment.

Pierce-Arrows Do Yeoman Work at Pittsburgh

WILLIAM PENN, in the Quaker days, never saw a motor truck, but when Pittsburgh men decided to erect a hotel and name is after that early Pennsylvania pioneer, motor trucks were decided upon as the best means of moving 75,000 cubic yards of material in the excavation within a time limit of 60 days. Three 5-ton Pierce-Arrows worked 20 hours a day and averaged eighty trips and 92 miles. Speed was a vital element. James L. Stuart, the contractor, obtained the contract because



Jeffery quad used as a locomotive, hauling eight steel dump cars running on narrow-gauge track. Grades as steep as 6.2 per cent were encountered

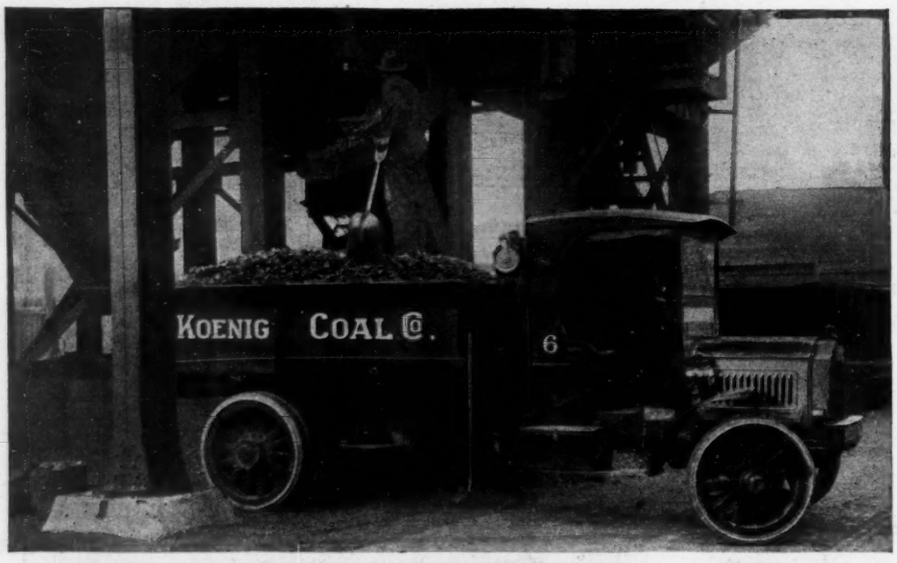
Knox tractor solves problem of moving ore from mine near Salt Lake City, Utah, hauling two trailers and a total load of 20 tons down a decline of 3,050 feet in 16 miles

he stipulated that he would finish it in 60 days, whereas his nearest competitor specified 90 days.

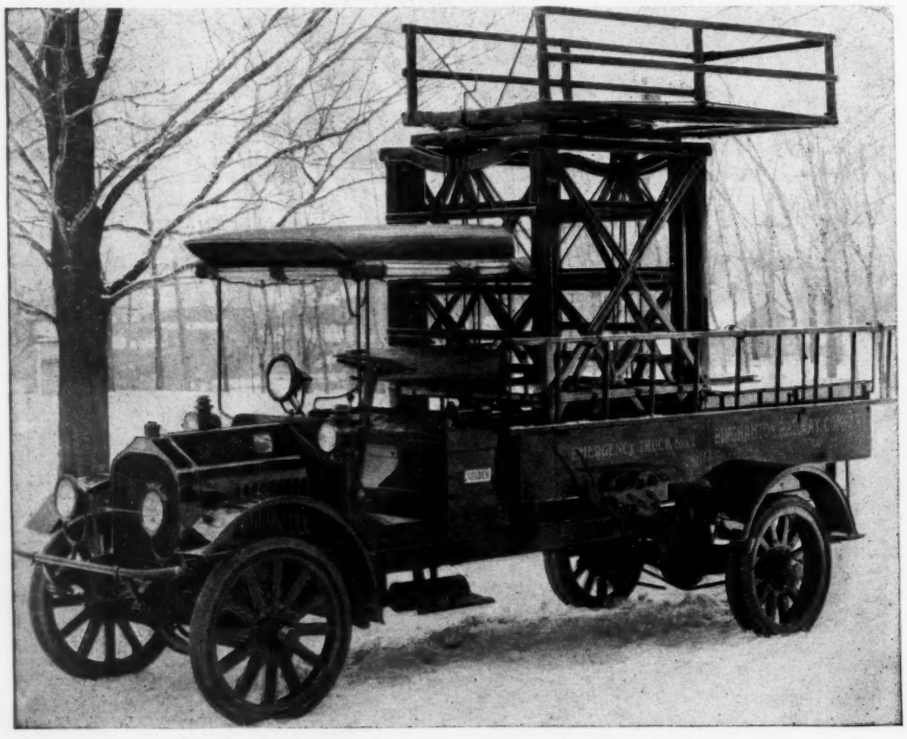
The three trucks performed the task that would have required sixty two-horse teams. The trucks hauled 75,000 cubic yards of clay, gravel and rock, which was loaded on the trucks with a steam shovel, to the Allegheny river where it was dumped on scows. To facilitate rapid disposal of the load from the trucks to the barge and on account of the congested quarters for handling the trucks, a turntable long enough to accommodate a truck and trailer was constructed. The truck and its trailer, when a trailer was used, were driven on the turntable and the load dumped into large wooden containers of 5 tons capacity each. These were picked up by a derrick and swung on to barges in rows of five each. When the load was dumped the turntable was operated and the truck

Four-Wheel-Drive truck makes 14 per cent grade while hauling ore at Victoria, Mich.

In the palmy days of P. T. Barnum, showmen did not dream of such apparatus for moving a circus. These Republic trucks carry 3 to 4 tons and trail 7 to 12 tons



Packard trucks in service of P. Koenig Coal Co., Detroit, Mich., deliver 113,390 pounds in 10 hours. Average 5⅛ miles per gallon of gas



Binghamton, N. Y., uses a Selden truck with a Trenton tower in its trolley repair work

sent away. Lost motion was a negative quantity in this operation.

Trailers were used a part of the time, especially at night, when there was no traffic congestion, but towards the end they were abandoned and the crews of the trucks claimed they got almost as much result without them. Each truck has a special dump body. Each truck weighed 9,100, the trailer 3,250, two men 300, load of truck 10,000, trailer load 7,000, making a total of 29,650 pounds.

After the excavation became too large to permit of the centrally-located steam shovel loading the trucks the dirt was moved to the side of the excavation in small cars and loaded to the trucks with a chain conveyor.

Jeffery a Locomotive

SOLUTION of the long and heavy haul in big paving operations was brought about by Hanlon & Okes, Minneapolis, Minn., and Sioux City, Ia., contractors, through the use of a 2-ton Jeffery quad as a locomotive to pull from eight to twelve dump trucks on narrow gauge railway, each trailer being loaded with 1½ yards of stone or sand. The truck itself straddled the tracks as shown in an illustration elsewhere in this story.

This work was done on a section of the Broken Kettle road, an extremely hilly road leading into Sioux City. There is hardly a straight or level stretch of any length on this part of the road. From the hopper where the trailers were loaded to the point where the paving process was under way, the truck was continually climbing grades ranging from 4 to 6.2 per cent.

For a period of 6 weeks this method of hauling was continued. The crew mixing and laying the concrete comprised between forty and fifty men and a steam mixer, with a conveyor bucket, was used. The truck not only was able to keep them supplied with materials, but often got a little ahead. The gasoline consumed averaged 22 gallons daily—12 to 14 hours. The truck hauled material enough to lay from fifteen to seventeen blocks of concrete, measuring 16 by 30 feet each, every day. The haul from the mixer to the point of delivery was a little over ½ mile and a round trip was made in 28 minutes.

A Factor in Mining

REPLACING eight-horse teams and doing the work at half the cost is an accomplishment of the Victoria Copper Mining Co., Victoria, Mich., which moves its ore over a road parts of which has a 14 per cent grade. The nearest railroad station is located 2 miles east of the Ontonagon river and the road from the mine to the railroad, while having a fairly good bottom, is very rough and sometimes extremely muddy. All the supplies for the mine must be hauled from the railroad station and all material from the mine to the railroad. The company once used two wagons drawn by four and sometimes six or

eight horses each, but now has a 3-ton four-wheel-drive truck which makes from three to five trips daily, hauling the wagons previously used, as trailers. The average haul is 14.71 tons. The company finds that it is costing less than one-half what it did formerly and the work is done in better shape and with less delay and trouble.

Not Like This When Barnum Was a Boy

IN THE old days when the elephants were commissioned to move the heavy circus trucks around the lot little thought was given to possible improvements that would relieve Jumbo of his task and at the same time prove a valuable adjunct to the circus. The Levitt-Taxier Shows United now move via the motor truck. Of course, this is not of Barnum and Bailey magnitude, but 3-ton Republic trucks, with heavy trailers are used to move the show from railroad to grounds and back. Each truck is always loaded with from 3 to 4 tons and in addition to this trails 7 to 12 tons at times. Therefore, these trucks may be seen moving as much as 16 tons each at times. Some of the worst roads in the country have been encountered, but the management of the show says that in the year it has been using these trucks they never have been stalled.

113,390 Pounds in 10 Hours

PACKARD points to the movement of one of its trucks in the service of the P. Koenig Coal Co., Detroit, Mich., as a good example of the efficiency of motor trucking. One truck moved eleven loads from 6 a. m. to 5 p. m., moving 113,390 pounds of coal, traveling during the day 73 miles. Fourteen gallons of gasoline were used; an average of 5⅕ miles per gallon.

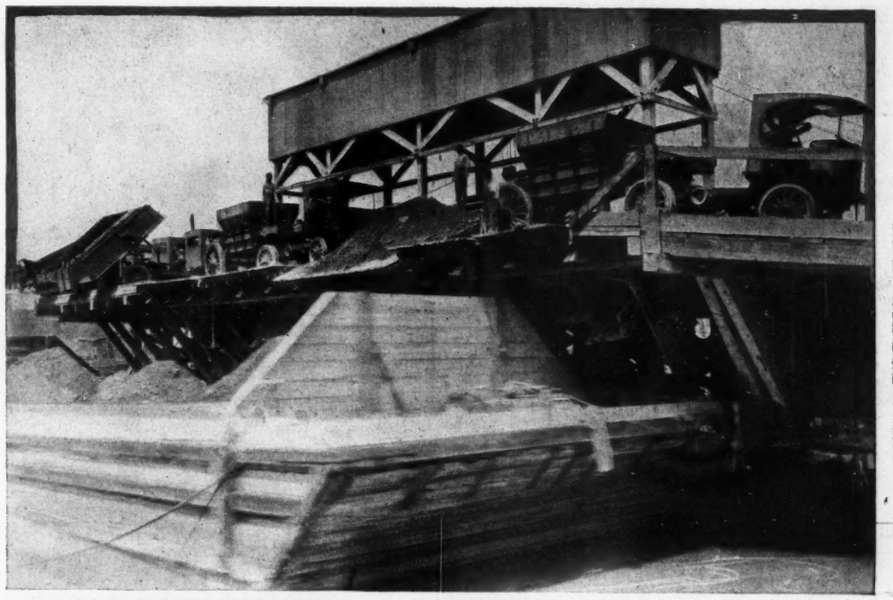
The approximate running time was 7 hours and 18 minutes and the delivery time 9½ minutes per load. If anyone has the idea that a truck loses much time with loading and unloading this record would seem to disprove such ideas. Of course, the speed of a truck is influenced by delivery conditions, delays on the road, etc., yet this instance is pointed out by Packard, not as an exception, but a conservative usual performance.

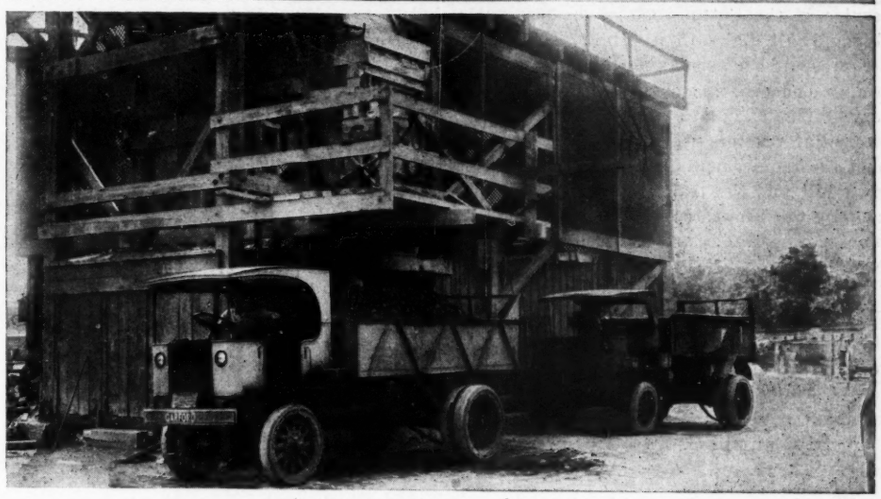
An Indian Water Wagon

BOMBAY, India, has motorized, or motor-truckized, its water wagon. The illustration herewith shows the adaption of a method centuries old applied to the modern means of transportation. This seems to prove that the people of India are not all without the germ of progressiveness. The illustration shows a 1½-ton Federal truck. They is no need of a tank wagon when you can get barrels of this size.

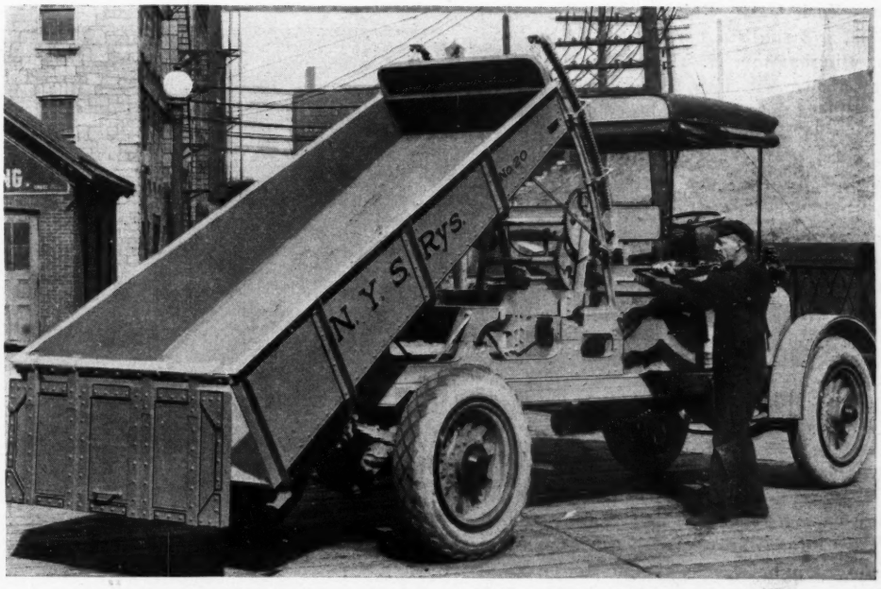
20 Tons of Ore Each Trip

BRINGING 20 tons per trip down a grade with a drop of 3,050 feet in 16 miles is a feat being performed by Knox tractors hauling two 5-ton Troy trailers in the





The two illustrations immediately above show parts of the operation of a fleet of Garford trucks in the construction of the New York subway. The material is handled by special loaders and deposited on scows in the river



The New York State Railways at Rochester, N. Y., uses a pneumatic-equipped Selden truck with special body for hurry-up daylight track repair

Each afternoon, when the last class has been dismissed, the students take their places at the wheels and start out with capacity loads on designated routes which cover a 9-mile radius around the school

service of the Cottonwood mines just outside of Salt Lake City, Utah. Handling ore presented a perplexing problem to the mining concern, inasmuch as the haul is very difficult. Both motor trucks and caterpillar tractors were tried but did not meet the requirements. The haul is mostly down hill and the trailers are mostly held back by the brakes on the tractor, though some of the grades are as steep as 16 per cent.

The tractor is equipped with steel wheels, 15 inches wide, fitted with diagonal cleats. The total tonnage of ore hauled in one week was 272,660 pounds and coal is carried back on the return trip. The average gasoline consumption is 21 gallons per round trip, 32 miles. Two trips are made daily.

Trucks and Street Railways

STREET railways make use of motor trucks hurry-up repair work and also for repairing broken trolley wires. The New York State Railways at Rochester, N. Y., and the Binghamton Street Railway Co., Binghamton, N. Y., use Selden trucks for this work. Two Seldens so equipped are illustrated. The 2-tonner used by the former is equipped with pneumatics all around and has a specially-designed bottom in the body for quick discharge of material. This job is used for hurry-up daylight track construction work. This equipment has been found both a time and money-saver for the company. Another Selden truck is shown equipped with a Trenton tower and replaces two horse-drawn repair wagons.

Harvey Hauls 141 Tons of Concrete Daily

AVERAGING nineteen round trips of 3½ miles each, carrying 5 tons or more each load, has been the daily record of two 5-ton Harvey trucks on a concrete paving job between Chicago Heights and Homewood, Ill., for several weeks this fall. The trucks are equipped with hydraulic hoists, rear-dump bodies and the loading is done with four 2½-cubic yard Lee loaders, one pair of loaders, with eight men shoveling, taking care of each truck. The trucks are doing about 66 miles every 10 hours, making more than 130 stops in that time. Figuring 6 tons to the load, which is about the average, each truck is delivering about 114 tons daily.

Trucks Help Educate

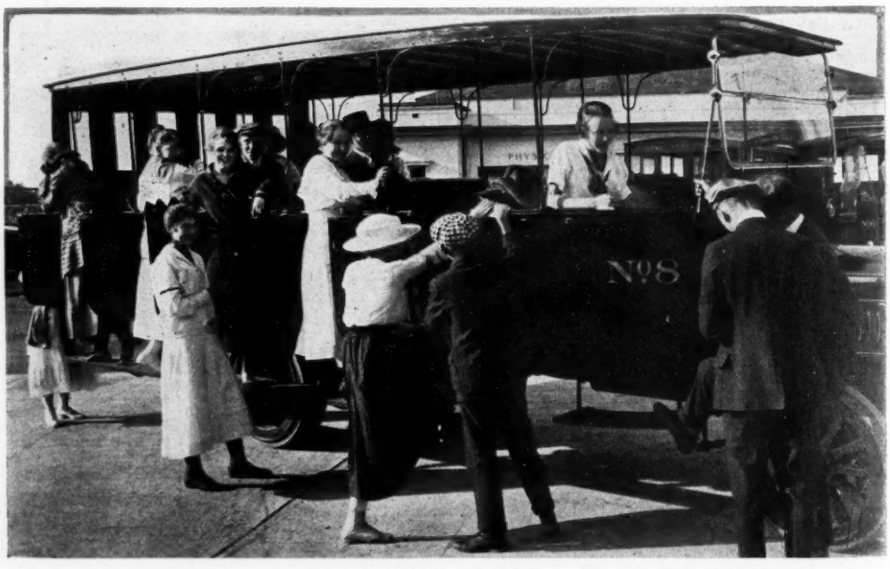
THE use of the motor truck as an ally of education is being demonstrated at Fullerton, Cal., by eight Moreland trucks, which not only assemble the students for school, but are material for study as part of the regular curriculum.

Fullerton, out in the Western citrus belt, has a union high school, and the directors of the school have gone into the transportation business to help make Fullerton High grow. For, when a central location was chosen for the present building several years ago, many of the students found they had to go a long distance to reach classrooms. The initial attempt to solve the problem consisted of one truck. Success marked the plan from the beginning, and other trucks followed.

A traffic expert from the factory outlined a route and schedule to cover a 9-mile radius around the school. The entire district was covered in this way, and the enrollment began to grow. Today more than 450 students attend.

Practically no cost is attached to the upkeep of the trucks. The little repair work that has been found necessary is done in the shops of the school. The mechanical department has proved amply able to keep them in condition. The expense is that for tires, oil and distillate, on which the trucks are run. No regular drivers are employed, for the students look after that end of the business also.

Each afternoon, when the last class has been dismissed for the day, the students take their places at the wheels and start



The driver who lives at the terminus of the run takes the truck home with him and next morning retraces his tracks to again collect his passengers

out with capacity loads on the designated routes. The driver delivers his load and then takes the truck home.

Every day the trucks are turned over to the mechanical department to serve as models in the class of commercial car construction. The subject of fuels is handled through the models of distillate burning devices on the Morelands. For the beginners' class the chassis are stripped and used in connection with technical lectures. Men from the Moreland factory sometimes act as assistant professors and explain the methods of utilizing distillate as a motive power. Distillate sells in California for less than half the price of gasoline. It is the standard fuel in the Morelands, and its success in that respect is shown by the mileage per gallon—10 miles to 1 gallon.

The truck equipment of the school is seldom allowed to remain idle. When there is a baseball or football game or track meet scheduled, the athletic department appropriates the trucks, and the Fullerton rooters are carried thus to the scene of action. The classes in botany make long trips into the country when it comes their turn. And various other departments find use for the trucks. Picnics are not tabooed when no more serious work is on hand.

Fullerton High School is an exceptional high school, though, aside from its transportation facilities. It is one of the pioneers in the junior college movement and is located in a district with a valuation of $15,000,000. Its trucks carry more than half of its 450 students to and from school every day.

Other districts throughout the West are centralizing their high schools since the success of Fullerton's plan of motorized transportation. More instructors, better buildings and equipment and facilities such as are usually found only in the larger cities come with this centralization. So, who can say the truck is not an ally of education, both in increasing the number of students and in making possible a broader curriculum.

Recent institutions that have taken up the truck plan of the Fullerton High School are those in Orange county and at Covina, San Bernardino, Redlands and Redondo. And if present indications can be taken as a criterion the motor truck is designated to become a fixture in their equipments.

A Directory of Motor Truck Makers

211 Manufacturers of Commercial Vehicles for 1917— 200 Gasoline—Two Steam and Nine Electric— Models Made in Tons Capacity

Name	Manufacturer	Address	MODELS IN TONS CAPACITY *Figures refer to capacity, not number of models*														
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
Gasoline Vehicles																	
A. & B	American & British Mfg. Co	Providence, R. I								3			5				
Acason	Acason Motor Truck Co	Detroit, Mich						2			3½						
Acme	Cadillac Auto Truck Co	Cadillac, Mich				1		2			3½						
Allis-Chalmers	Allis-Chalmers Mfg. Co	Milwaukee, Wis											5				
American	American Motor Truck Co	Hartford, Conn						2									
Armleder	O. Armleder Co	Cincinnati, Ohio						2			3½						
Atlas	Martin Carriage Wks	York, Pa		½													
Atterbury	Atterbury Motor Car Co	Buffalo, N. Y				1	1½	2			3½						
Autocar	Autocar Co	Ardmore, Pa					1½	2									
Available	Available Truck Co	Chicago, Ill				1		2			3½		5				
Avery	Avery Co	Peoria, Ill				1		2		3			5				
Barker	C. L. Barker	Norwalk, Conn				1		2									
Bauer	Bauer Machine Wks. Co	Kansas City, Mo		½	¾												
Beech Creek	Beech Creek Truck & Auto Co	Beech Creek, Pa								3							
Bell	Bell Motor Car Co	York, Pa		⅝													
Bessemer	Bessemer Motor Truck Co	York, Pa				1		2			3½		5				
Blair	Blair Motor Truck Co	Newark, Ohio						2		3		4	5				
Bourne	Bourne Magnetic Truck Co	Philadelphia, Pa															
Brinton	Chester County Motor Co	Coatesville, Pa			¾				2½								
Briscoe	Briscoe Motor Co	Jackson, Mich		½													
Brockway	Brockway Motor Truck Co	Cortland, N. Y				1	1½	2			3½						
Brown	Brown Carriage Co	Cincinnati, Ohio		½													
Bulkley-Rider	Bulkley-Rider Tractor Co	Los Angeles, Cal															T
Burford	H. E. Burford Co	Fremont, Ohio						2			3½						
Carlton	Carlton-Hill Motor Car Co	Rutherford, N. J															
Casey	F. A. Casey	Billerica, Mass		½													
Chase	Chase Motor Truck Co	Syracuse, N. Y				1	1½		2½	3	3½						
Clyde	Clyde Motor Truck Co	Farmingdale, L. I															
Coleman	Coleman Carriage & Harness Co	Ilion, N. Y						2		3							
Collier	Collier Motor Truck Co	Painesville, Ohio			¾												
Columbia	Columbia Motor Truck & Trailer Co	Pontiac, Mich						2									
Commerce	Commerce Motor Car Co	Detroit, Mich			¾	1											
Comet	Comet Automobile Co	Rockford, Ill		½													
Continental (C)	Continental Motor Truck Co	Chicago, Ill				1	1½	2			3½						
Corbitt	Corbitt Automobile Co	Henderson, N. C					1½	2	2½		3½						
Corliss	Corliss Motor Truck Co	Corliss, Wis		½													
Couple-Gear	Couple-Gear Freight Wheel Co	Grand Rapids, Mich									3½		5				
Crawford	Crawford Automobile Co	Hagerstown, M								3							
Croce	Croce Automobile Co	Asbury Park, N. J		½													
Crown	Crown Commercial Car Co	North Milwaukee, Wis			¾		1½		2½								
Crowther-Duryea	Crowther Motor Co	Rochester, N. Y		⅝													
Dain	Dain Mfg. Co	Ottumwa, Iowa				1											
Dart	Dart Motor Truck Co	Waterloo, Iowa			¾		1½		2½								
Dayton	Durable Dayton Truck Co	Dayton, Ohio						2			3½		5				7½

Heavy type represents vehicles whose specifications are given in this issue.

A Directory of 211 Manufacturers of Gasoline, Steam and

Name	Manufacturer	Address	MODELS IN TONS CAPACITY *Figures refer to capacity, not number of models*													
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
D-E	Day-Elder Motors Co	Newark, N. J		⅝													
DeKalb	DeKalb Wagon Wks. Co	DeKalb, Ill						2	2½								
Denby	Denby Motor Truck Co	Detroit, Mich				1	1½	2	2½								
Denmo	Denneen Motor Co	Cleveland, Ohio		½		1½											
Diamond-T	Diamond-T Motor Car Co	Chicago, Ill			¾		1½	2			3½						
Dispatch	Dispatch Motor Car Co	Minneapolis, Minn		⅝													
Doane	Doane Motor Truck Co	San Francisco, Cal							2½						6		
Dominion	Dominion Motor Truck Co	Detroit, Mich													6		T
Dornfield	John Dornfield Co	Watertown, Wis															
Dorris	Dorris Motor Car Co	St. Louis, Mo			¾			2									
Duplex	Duplex-Power Car Co	Charlotte, Mich						2		3							
Ellsworth	Mills-Ellsworth Co	Keokuk, Iowa		½													
Erie	Erie Motor Truck Mfg. Co	Erie, Pa															
Fargo	Fargo Motor Car Co	Chicago, Ill				1		2									
Fawick	Fawick Motor Car Co	Sioux Falls, S. D		½	¾	1		2									
Federal	Federal Motor Truck Co	Detroit, Mich				1	1½	2			3½		5				
Forschler	Forschler Wagon Co	New Orleans, La				1		2									
Ford	Ford Motor Co	Detroit, Mich				1											
Frome	R. L. Frome Mfg. Co	Sheboygan, Wis															
F. W. D	Four Wheel Drive Auto Co	Clintonville, Wis					1½			3			5				
Gabriel	Gabriel Auto Co	Cleveland, Ohio			¾	1	1½										
Garford	Garford Motor Truck Co	Lima, Ohio				1	1½	2			3½		5		6		
Gary	Gary Motor Truck Co	Gary, Ind			¾	1	1½	2									
G. A. Schacht	G. A. Schacht Motor Truck Co	Cincinnati, Ohio					1½	2		3							
Geneva	Geneva Wagon Co	Geneva, N. Y			¾												
Gersix	Gerlinger Motor Car Co	Portland, Ore							2½								
Globe	Globe Furniture Co	Northville, Mich				1¼											
G. M. C	General Motors Truck Co	Pontiac, Mich			¾	1	1½	2			3½		5				
Gramm-Bernstein	Gramm-Bernstein Co	Lima, Ohio				1	1½	2	2½		3½		5		6		
Great Southern	Great Southern Automobile Co	Birmingham, Ala						2				4					
G. V.-Mercedes	General Vehicle Co	Long Island City, N. Y													6		
Hahn	Hahn Motor Truck Co	Hamburg, Pa				1		2									
Hall	Lewis-Hall Iron Wks	Detroit, Mich						2			3½		5				
Harrison	Robert Harrison Co	South Boston, Mass									3½						
Harvey	Harvey Motor Truck Co	Harvey, Ill						2			3½		5				
Hawkeye	Hawkeye Mfg. & Repair Co	Sioux City, Iowa				1¼											
Henderson	Henderson Bros	North Cambridge, Mass			⅔	1											
Hercules	Hercules Motor Truck Co	South Boston, Mass															
Horner	Detroit-Wyandotte Motor Co	Wyandotte, Mich					1½	2		3			5				
Hurlburt	Hurlburt Motor Truck Co	New York City					1½	2			3½		5				7
I. H. C	International Harvester Corp	Akron, Ohio			¾	1											
Independent	Independent Motors Corp	Port Huron, Mich				1		2									
Indiana	Indiana Truck Co	Marion, Ind				1	1½			3			5				
Inter-State	Inter-State Motor Co	Muncie, Ind	⅔														
Iowa	Iowa Motor Truck Co	Ottumwa, Iowa				1	1½										
Jeffery	Nash Motors Co	Kenosha, Wis			¾		1½	2									
Kearns	Kearns Motor Car Co	Beavertown, Pa		½													
Kelly-Springfield	Kelly-Springfield Motor Truck Co	Springfield, Ohio					1½		2½		3½	4	5		6		
King	A. R. King Mfg. Co	Kingston, N. Y									3½						
KisselKar	Kissel Motor Car Co	Hartford, Wis			¾	1		2	2½			4	5				
Kleiber	Kleiber Co., Inc	San Francisco, Cal				⅞	1½	2	2½		3½		5				
Knickerbocker	Knickerbocker Motor Truck Co	New York City									3½		5				
Knox	Knox Motors Co	Springfield, Mass								3							T
Koehler	H. J. Koehler Motors Corp	Newark, N. J				1											
Koenig & Luhrs	Koenig & Luhrs Wagon Co	Quincy, Ill															
Krebs	Krebs Commercial Car Co	Clyde, Ohio					1½	2			3½						
Kressler	Kressler Auto Co	Fostoria, Ohio		½													
Lambert	Buckeye Mfg. Co	Anderson, Ind				1											
Landshaft	William Landshaft & Son	Chicago, Ill				1		2									
Lane	Lane Motor Truck Co	Kalamazoo, Mich			¾												
Lange	Lange Motor Truck Co	Pittsburgh, Pa					1½		2½								
Larrabee	Larrabee-Deyo Motor Truck Co	Binghamton, N. Y				1	1½		2½								
Lawson	Lawson Mfg. Co	Pittsburgh, Pa		½													
Lenox	Lenox Motor Car Co	Boston, Mass															
Lima	Lima Light Car Mfg. Co	Lima, Ohio		½													
Lincoln	Lincoln Motor Truck Co	Detroit, Mich				1											
Lippard-Stewart	Lippard-Stewart Motor Car Co	Buffalo, N. Y		½	¾	1	1½	2									
Little Giant	Chicago Pneumatic Tool Co	Chicago, Ill			¾	1	1½	2									
Lombard	Lombard Auto Tractor-Truck Corp	New York City											5				
Lord Baltimore	Lord Baltimore Motor Truck Co	Baltimore, Md				1		2									
Maccar	Maccar Co	Scranton, Pa					1½		2½		3½			5½			
Mack	International Motor Co	New York City				1	1½	2			3½			5½			7½
Manly	Manly Motor Corp	Chicago, Ill					1½		2½								
Maxwell	Maxwell Motor Co	Detroit, Mich	¼														
Menominee	D. F. Poyer Co	Menominee, Mich			¾	1	1½	2			3½						
Mercury-Bulley	Mercury Mfg. Co	Chicago, Ill															T
Metropolitan	Metropolitan Motors, Inc	New York City															
Metz	Metz Co	Waltham, Mass		½													
Modern	Bowling Green Motor Car Co	Bowling Green, Ohio				1	1½	2			3½						
Mogul	Mogul Motor Truck Co	St. Louis, Mo					1½	2	2½		3½						
Moon	Jos. W. Moon Buggy Co	St. Louis, Mo					1½										
Moreland	Moreland Motor Truck Co	Los Angeles, Cal				1	1½		2½			4	5				
Morton	Morton Truck & Tractor Co	Harrisburg, Pa								3							
Nelson & LeMoon	Nelson & LeMoon	Chicago, Ill				1		2		3							
Netco	New England Truck Co	Fitchburg, Mass						2									
New York	Tegetmeier & Reipe	New York City					1½										
Niles	Niles Car & Mfg. Co	Niles, Ohio				1		2									
Old Hickory	Kentucky Wagon Mfg. Co	Louisville, Ky		⅝													
Old Reliable	Old Reliable Motor Truck Co	Chicago, Ill					1½	2	2½	3		4	5				7
Overland	Willys-Overland Co	Toledo, Ohio	⅔	⅜													

Heavy type represents vehicles whose specifications are given in this issue.

and Electric Commercial Vehicles for 1917—Continued

Name	Manufacturer	Address	MODELS IN TONS CAPACITY *Figures refer to capacity, not number of models*													
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
Packard	Packard Motor Car Co	Detroit, Mich				1	1½	2		3		4					
Packet	Packet Motor Truck Co	St. Paul, Minn	⅜														
Palmer	Palmer-Meyer Motor Car Co	St. Louis, Mo				1		2									
Palmer-Moore	Palmer-Moore Co	Syracuse, N. Y			¾	1											
Paulding	Anchor Auto Co	St. Louis, Mo			¾	1	1½	2									
Peerless	Peerless Motor Car Co	Cleveland, Ohio						2		3		4	5				
Pennsy	Pennsy Motors Co	Pittsburgh, Pa		½													
Phoenix Centiped	Phoenix Mfg. Co	Eau Claire, Wis											5				
Pierce-Arrow	Pierce-Arrow Motor Car Co	Buffalo, N. Y						2					5				
Pullman	Pullman Motor Car Co	York, Pa		½													
Rainier	Rainier Motor Corp	New York City		½													
Reo	Reo Motor Car Co	Lansing, Mich			¾			2									
Republic	Republic Motor Truck Co	Alma, Mich			¾	1	1½	2		3							
Riker	Locomobile Co	Bridgeport, Conn								3		4					
Robinson	Robinson Fire Apparatus Co	St. Louis, Mo															T
Robinson	Golden West Motors Co	Sacramento, Cal						2									
Rocco	Rocco Motor Co	Hannibal, Mo															
Rowe	Rowe Motor Truck Co	Downington, Pa				1		2		3			5				
Royal	Royal Motor Truck Co	New York City				1		2			3½		5		6		7
Rush	Rush Motor Truck Co	Philadelphia, Pa		½													
Salvador	Mansur Motor Truck Co	Haverhill, Mass						2									
Sandow	Sandow Motor Truck Co	Chicago, Ill					1½	2		3							
Sanford	Sanford Motor Truck Co	Syracuse, N. Y				1	1½	2									
Saurer	International Motor Co	New York City											5			6½	
Schleicher	Schleicher Motor Vehicle Co	New York City								3			5				
Selden	Selden Motor Vehicle Co	Rochester, N. Y			¾	1		2			3½						
Service	Service Motor Truck Co	Wabash, Ind				1	1½	2			3½		5				
Signal	Signal Motor Truck Co	Detroit, Mich				1	1½	2			3½		5				
Sphinx	Sphinx Motor Car Co	York, Pa		½													
Standard	Standard Motor Truck Co	Detroit, Mich						2			3½	4	5				
States	States Motor Co	Kalamazoo, Mich		½													
Steele	W. M. Steele	Worcester, Mass						2		3		4	5				
Stegeman	Stegeman Motor Car Co	Milwaukee, Wis					1½		2½		3½		5				
Sterling	Sterling Motor Truck Co	Milwaukee, Wis							2½		3½		5				7
Stewart	Stewart Motor Corp	Buffalo, N. Y		½	¾	1¼											
Studebaker	Studebaker Corp	Detroit, Mich		½		1											
Sullivan	Sullivan Motor Car Co	Rochester, N. Y					1½	2									
Superior	E. G. Willingham's Sons	Atlanta, Ga				1		2									
Thomas	Thomas Auto Truck Co	New York City							2½								
Tiffin	Tiffin Wagon Co	Tiffin, Ohio			¾	1	1½		2½				5		6		
Tower	Tower Motor Truck Co	Greenville, Mich						2									
Transit	Transit Motor Car Co	Louisville, Ky				1		2			3½		5				
Transport	Transport Tractor Co	Long Island City, N. Y											5				
Tulsa	Tulsa Auto & Mfg. Co	Tulsa, Okla															
Twin City	Brasie Motor Car Co	Minneapolis, Minn				1		2									
Union	Union Motor Truck Co	Bay City, Mich							2½								
United	United Motors Co	Grand Rapids, Mich						2			3½	4	5				
Universal	Universal Service Co	Detroit, Mich					1½	2		3							
U. S	United States Motor Truck Co	Covington, Ky						2		3	3½		5				
Van	Van Motor Truck Co	Newburgh, N. Y															
Van Winkle	Van Winkle Motor Truck Co	Atlanta, Ga															
Velie	Velie Motor Vehicle Co	Moline, Ill						2			3½						
Vim	Vim Motor Truck Co	Philadelphia, Pa		½													
Voltz	Voltz Bros	Chicago, Ill								3			5				
Walter	Walter Motor Truck Co	New York City									3½						7½
Watson	Watson Wagon Co	Canastota, N. Y											5				
Ware	Twin City Four Wheel Drive Co	St. Paul, Minn								3							
Washington	Washington Motor Car Co	Hyattsville, Md											5		6		7
White	White Co	Cleveland, Ohio			¾		1½			3			5				
Wichita	Wichita Falls Motor Co	Wichita Falls, Tex				1	1½	2	2½		3½		5				
Wilcox	H. E. Wilcox Motor Co	Minneapolis, Minn			¾	1	1½	2			3½						
Wilson	J. C. Wilson Co	Detroit, Mich						2									
Wisconsin	Myers Machine Co	Sheboygan, Wis				1¼			2½								
Witt-Will	Witt-Will Co	Washington, D. C				1		2									
W-S	Weier-Smith Truck Co	Birmingham, Mich							2½								
Zeitler & Lamson	Zeitler & Lamson Truck Co	Chicago, Ill					1½		2½		3½		5				

Steam Vehicles

Stanley	Stanley Motor Carriage Co	Newton, Mass			¾	1¼											
Titan	American Machine Co	Newark, Del															

Electric Vehicles

Atlantic	Atlantic Vehicle Co	Newark, N. J				1		2			3½		5				
Couple-Gear	Couple-Gear Freight Wheel Co	Grand Rapids, Mich									3½		5				7
C. T	Commercial Truck Co	Philadelphia, Pa		½		1		2			3½		5				
G. V	General Vehicle Co	Long Island City, N. Y		½		1		2			3½		5				
Lansden	Lansden Co	Brooklyn, N. Y	⅜	½		1		2			3½		5				T
Old Hickory	Kentucky Wagon Mfg. Co	Louisville, Ky				1											
Urban	Kentucky Wagon Mfg. Co	Louisville, Ky			¾		1½		2½			4					
Walker	Walker Vehicle Co	Chicago, Ill		½		1		2		3		4	5				
Ward	Ward Motor Vehicle Co	Mount Vernon, N. Y	⅜	½		1		2			3½		5				

Heavy type represents vehicles whose specifications are given in this issue.

Prices of 1917 Gasoline Motor Trucks

Classified According to Load Capacity and Combined with Salient Features of Chassis

TRUCKS UNDER ½-TON CAPACITY

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Maxwell 25	$535	103	pneu	21.08	s&l	selec	bevel
Overland 75-B	625-c	104	pneu	18.21	s,l&i	selec	bevel
Packet	350	100	pneu	12.08	none	fric	dbl chn

TRUCKS OF ½-TON CAPACITY

Atlas 17	$690	106	pneu	16.92		selec	sp-bev
Briscoe 4-24	625	104	pneu	16.92	s,l&i	selec	bevel
Corliss A	800-c*	100	pneu	15.64		selec	bevel
Croce 17	825	108	p&s	16.92		selec	bevel
Crowther-Duryea	600-c	110	pneu	22.50	s, l&i	roller	roller
D-E Junior	895	108	pneu	15.64	s&l	selec	top worm
Dispatch G	1,150	120	pneu	22.50	s&l	fric	dbl chn
Ellsworth 25-A	695-c	108	pneu	16.92	s,l&i	selec	bevel
Lawson 35		112	pneu	22.50	s&l-2	selec	bevel
Lippard-Stewart MW	1,000	106	pneu	16.92	s&l-2	selec	top worm
Old Hickory	825	112	pneu	16.92	s&l-2	selec	bevel
Overland 75-B	725	106	pneu	27.20	s,l&i-2	selec	bevel
Pennsy 15	660	98	pneu	27.20		selec	bevel
Pullman 4-24		114	pneu	22.50	s&l-2	selec	bevel
Rainier	850	115	pneu	16.92	s&l	selec	top worm
Rush D	695	105	pneu	16.92	s&l-2	selec	bevel
Stewart 5	695	106	pneu	14.40	none	selec	int-gear
Studebaker SF	785	112	pneu	24.22	s&l-2	selec	bevel
Vim 20	635	102	pneu	14.40		selec	bevel

TRUCKS OF ¾-TON CAPACITY

Brinton H	$950	115	pneu*	16.92	lighting	selec	top worm
Collier M	800	118	pneu	16.92	s,l&i	selec	bevel
Commerce N	975-c	120	pneu	19.61	s,l&i	selec	bevel
Dart BB	1,200	124	solid	19.61	none	selec	top worm
Dorris I-B-4	1,900	132	pneu	30.65	lighting	prog	sp-bev
Geneva 1		96	solid	22.10		plan	dbl chn
G.M.C 15	1,090	122	pneu	19.61	none	selec	bevel
I.H.C H	1,225	115	solid	19.61	s&l*	selec	int-gear
Jeffery 1016	965	116	pneu	22.50	s&l-2	selec	sp-bev
Kisselkar	950	124	pneu	24.22	s&l-2*	selec	sp-bev
Kleiber AA	1,600	130*	solid*	22.50	lighting	selec	top worm
Lane A	1,075	120	solid*	16.92		selec	top worm
Lippard-Stewart W	1,600	125*	pneu	22.50	s&l	selec	top worm
Little-Giant 15	1,500	138	p&s	19.61	lighting	selec	top worm
Menominee EW	1,295	124	cush	22.50	none	selec	top worm
Palmer-Moore K	1,150	106	solid	19.61	s&l*	selec	int-gear
Reo F	1,000	120	pneu	27.20	s&l-2	selec	sp-bev
Republic 9	750	120	cush	16.92	lighting	selec	int-gear
Selden G	985	110	pneu	15.64	s&l	selec	top worm
Stewart 3	1,290	118	pneu	19.61	s&l-2	selec	int-gear

TRUCKS OF ¾-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Tiffin A	$1,190	110	pneu*	19.61	none	selec	int-gear
White GBBE	2,100	133½	pneu	22.50	s&l	selec	bevel
Wilcox M	1,200	120	pneu	19.61	lighting	selec	top worm

TRUCKS OF 1-TON CAPACITY

Acme B	$1,500	128	pneu*	19.61	s,l&i	selec	top worm
Atterbury 6B	1,775	140½	solid	22.50		selec	top worm
Available 1	1,700	132*	solid	22.50		selec	top worm
Avery C	1,690	128	solid	27.20		selec	dbl chn
Bessemer G	975	124	solid	19.61		selec	int-gear
Brockway O	1,450	124*	solid*	19.61		selec	top worm
Chase A	1,650		solid	19.61		selec	top worm
Commerce E	1,175	126	solid	19.61	s&l-2	selec	int-gear
Continental (C) FL	1,550	144	solid	22.50		selec	top worm
D-E Senior	1,450	128*	solid	19.61		selec	top worm
Denby R	990	119	pneu	15.64	s&l	selec	int-gear
Denmo 10	1,385	124	p&s*	22.50	s&l-2	selec	int-gear
Diamond-T J5	1,485	132	solid	19.61		selec	top worm
Federal S		132	solid*	19.61	s,l&i*	selec	top worm
Forschler	1,650	130	solid*	19.61	none	selec	top worm
Garford 75	1,450	120	p&s	19.61	s&l	selec	top worm
Globe	1,375	130*	solid	25.39		selec	int-gear
G.M.C 21		136	solid	22.50	none	selec	top worm
Gramm-Bernstein	1,650	124*	solid	22.50	s&l-2*	ind-c	top worm
Hahn C	1,750	136*	solid	27.20		selec	top worm
Hawkeye H	1,300	136*	solid	22.50		selec	int-gear
I.H.C F	1,500	128*	solid	19.61	s&l*	selec	int-gear
Independent F	1,385	128*	solid*	19.61	s,l&i	selec	top worm
Kisselkar	1,250	132	solid*	24.22	s&l-2*	selec	top worm
Koehler K	895	129	solid	19.61	none	selec	int-gear
Lambert V2	1,700	144	solid	29.00	s&,li	fric	dbl chn
Larrabee	1,550	130	solid*	22.50	s,l&i	selec	top worm
Lincoln L	975	122*	pneu	19.61	s,l&i	selec	bevel
Lippard-Stewart H	2,000	145	solid	22.50	s&l	selec	top worm
Little Giant H	1,400	110	solid	19.61			dbl chn
Mack AB	2,000	144*	solid	25.60	s&l-2	selec	dbl chn
Mack AB	2,000	144*	solid	25.60	s&l-2	selec	top worm
Menominee FW	1,575	130*	solid	22.50	none	selec	top worm
Moreland 15-D	1,650	126	solid	22.50	lighting	selec	top worm
Nelson & LeMoon E1	1,700	opt	solid	22.50		selec	top worm
Niles B	1,175	124	pneu	19.61	opt	selec	top worm
Packard 1-D	2,200	126*	solid	25.60	s&l-2	prog	top worm
Palmer	1,350	132½	solid	22.50	none	selec	int-gear
Palmer-Moore M	1,350	126	solid	22.50	s&l*	selec	int-gear
Republic 10		124	solid	19.61	s&l-2	selec	int-gear
Royal		124*	solid	16.92	starting	ind-c	top worm
Sanford O	1,290	120	pneu*	19.61		selec	int-gear
Selden TL	1,700	126½	solid	19.61	s&l-2	selec	top worm
Service 120	1,375	135	solid*	19.61	s&l-2*	selec	top worm
Signal F	1,550	144*	solid	22.50		selec	top worm
Stewart 4	1,390	128	solid	19.61		selec	int-gear
Studebaker 7	1,100	125	pneu	24.22	s&l-2	selec	bevel
Superior A	1,350	124*	solid	19.61	none	selec	int-gear
Tiffin AW	1,450	112	solid	19.61		selec	top worm
Wichita A	1,350	110*	solid	16.92	s&l-2	selec	dbl chn
Wichita K	1,650	118*	solid	19.61	s&l-2	selec	top worm
Wilcox S	1,600	128	pneu*	22.50	lighting	selec	top worm
Witt Will WD16	2,000	120	solid*	22.50		selec	top worm
Wisconsin B	1,650	136	solid	19.61		selec	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System** s&l, *starting and lighting;* s, l & i, *starting; lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

TRUCKS OF 1½-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Atterbury 6R	$1,875	140½	solid	22.50		selec	top worm
Brockway J-2	1,825	124	solid	22.50		selec	top worm
Chase C	1,950	138	solid	19.61		selec	top worm
Continental (C) HL	1,750	144	solid	22.50		selec	top worm
Corbitt D	2,150	138	solid	22.50		selec	top worm
Dart E	1,800	130	solid	22.50		selec	top worm
Denby G	1,575	120*	solid	19.61	s&l-2	selec	int-gear
Diamond-T J4	2,050	154*	solid	22.50		selec	top worm
Federal J-M	1,800	144*	solid	27.20	s&l-2	selec	top worm
Garford 66	1,800	142*	solid	22.50	s&l	selec	top worm
G. A. Schacht	2,650	138*	solid	29.00		selec	top worm
G.M.C 31	1,900	144*	solid	22.50	none	selec	top worm
Gramm-Bernstein	2,000	130*	solid	22.50	s&l-2*	ind-c	top worm
Horner	2,250	145	solid	27.20		selec	top worm
Hurlburt	2,250	136*	solid	22.50	lighting	selec	top worm
Jeffery 2016	1,465	130	p&s	22.50	s&l-2	selec	int-gear
Kelly-Springfield K-31	2,000	144*	solid*	22.50	s&l-2	selec	dbl chn
Kelly-Springfield K-32	2,000	144*	solid*	22.50	s&l-2	selec	top worm
Kleiber A1	2,250	140*	solid	27.20	lighting	selec	top worm
Krebs 40	2,050	146	solid	22.50		selec	top worm
Lange C	1,850	130*	solid	22.50	none	ind-c	dbl chn
Larrabee	2,000	140*	solid	27.20	s.l&i-2	selec	top worm
Lippard-Stewart F	2,300	145*	solid	27.20	s&l	selec	top worm
Little Giant H	1,500	110	solid	19.61		selec	dbl chn
Maccar L	2,100	150	solid	27.20	none	selec	worm
Mack AB	2,350	162*	solid	25.60	s&l-2	selec	top worm
Mack AB	2,350	162*	solid	25.60	s&l-2	selec	dbl chn
Menominee H	1,775	130*	solid	22.50	none	selec	top worm
Moreland 15-B	1,950	126*	solid	27.20	lighting	selec	top worm
Moon B	1,600	140*	solid	22.50	none	selec	dbl chn
New York M	2,200	144*	solid	27.20		ind-c	top worm
Old Reliable	1,950	150*	solid	22.50	lighting	selec	top worm
Packard 1½-D	2,500	126*	solid	25.60	s&l-2	prog	top worm
Republic 11		144	solid	22.50	s&l-2	selec	int-gear
Sanford R	1,370	138	solid*	19.61		selec	dbl chn
Service 130	1,950	150	solid	27.20	s&l-2*	selec	top worm
Signal H	1,800	144*	solid	27.20		selec	top worm
Stegeman	1,900	150	solid	25.39	s&l-2	selec	top worm
Sullivan G	1,650	129	solid	22.50		selec	dbl chn
Tiffin GW	1,790	135	solid	22.50		selec	top worm
Universal G	1,950	133*	solid	22.50	lighting	selec	top worm
White TBC	3,000	145½	pneu	22.50	s&l	selec	db-red
Wichita L	1,800	118*	solid	19.61	s&l-2	selec	top worm
Wilcox R	1,800	134	solid	29.00	lighting	selec	top worm
Zeitler & Lamson	1,850	150*	solid	25.60	l&i*	ind-c	top worm

TRUCKS OF 2-TON CAPACITY

Acason 2		150	solid	29.00		selec	top worm
Acme A	$2,100	148*	solid	27.20	lighting	selec	top worm
Armleder HW-2	2,800	166*	solid	27.20	lighting	selec	top worm
Atterbury 6C	2,375	153½	solid	27.20		selec	top worm
Autocar 21F	1,650	97*	solid*	18.10		prog	db-red
Available 2	2,250	156*	solid	27.20		selec	top worm
Avery B	2,700	128	solid	36.15		selec	dbl chn
Bessemer D	2,200*	146*	solid	27.20		selec	top worm
Blair C	2,850	121*	solid	29.00		ind-c	top worm
Brockway K-2	2,125	140*	solid	27.20		selec	top worm
Burford O-3	2,250	144*	solid	22.50	lighting	selec	int-gear
Columbia E	1,750	144*	solid	27.20	none	selec	int-gear
Continental (C) J	2,100	146	solid	27.20		selec	top worm
Corbitt C	2,400	148	solid	27.20		selec	top worm
Dayton H	2,650		solid	29.00		selec	dbl chn
DeKalb D-1½	2,100	134*	solid	27.20	none	selec	top worm
Denby H	1,790	144*	solid	22.50	s&l-2	selec	int-gear
Diamond-T J3	2,200	154*	solid	27.20		selec	top worm
Dorris I-B-W	1,990	132	pneu	30.65		selec	top worm
Federal O-P	2,100	144*	solid	27.20	s&l-2	selec	top worm
Forschler	2,250	140*	solid*	27.20	none	selec	top worm
Garford 70	2,300	142*	solid	29.00	s&l	selec	top worm
G. A. Schacht	2,800	144*	solid	29.00		selec	top worm
G.M.C 41	2,375	158*	solid	27.20	none	selec	top worm
Gramm-Bernstein	2,300	146*	solid	22.50	s&l-2*	ind-c	top worm

TRUCKS OF 2-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Hahn E	$2,250	144*	solid	32.40		selec	top worm
Hall	2,000	132	solid	27.20	lighting	selec	top worm
Harvey W-F	2,250	150	solid	29.00	s&l-2	selec	top worm
Horner	2,650	145	solid	27.20		selec	top worm
Hurlburt	3,300	148	solid	27.20	lighting	selec	top worm
Independent G	1,850	144	solid	27.20		selec	top worm
Jeffery 4016	2,850	124*	solid	29.00	s&l-2	ind-c	int-g-4
Kisselkar	1,875	144*	solid	29.00		selec	top worm
Kleiber A2	2,400	145*	solid	27.20	lighting	selec	top worm
Krebs 60	2,375	162	solid	27.20		selec	top worm
Lange B	2,450	136*	solid	27.20	none	ind-c	dbl chn
Lippard-Stewart G	2,600	158*	solid	27.20	s&l	selec	top worm
Little Giant 16	2,500	144	solid	27.20		selec	top worm
Mack AB	2,700	162*	solid	25.60	s&l-2	selec	top worm
Mack AB	2,700	162*	solid	25.60	s&l-2	selec	dbl chn
Menominee D	2,240	144*	solid	27.20	none	selec	top worm
Nelson & LeMoon E2	2,250	opt	solid	27.20		selec	top worm
Netco D	2,350	144*	solid	27.20	s.l&i	selec	top worm
Netco E	2,600	144*	solid	33.75	s.l&i	prog	top worm
Niles E	1,875	140*	solid	27.20	opt	selec	top worm
Old Reliable	2,450	150	solid	25.60	lighting	selec	top worm
Packard 2-D	2,800	144*	solid	25.60	s&l-2	prog	top worm
Palmer	1,975	144	solid	27.20	none	selec	top worm
Peerless TC2		145	solid	32.40		selec	top worm
Pierce-Arrow	3,000	150*	solid	25.60		selec	top worm
Reo J	1,650	146	solid	27.20		selec	dbl chn
Republic 12		144*	solid	27.20	s&l-2	selec	int-gear
Sanford S	2,100	150*	solid	29.00		selec	int-gear
Selden TC	2,000	150	solid	22.50	s&l-2	selec	top worm
Selden JWD	2,250	150	solid	27.20	s&l	selec	top worm
Service 140	2,250	160*	solid	27.20	s&l-2*	selec	top worm
Signal J	2,100	150*	solid	27.20		selec	top worm
Standard 70	2,000	140	solid	27.20		selec	top worm
Steele C	2,250	115*	solid	27.20	lighting	ind-c	dbl chn
Sullivan E	2,250	150	solid	27.20		selec	top worm
Superior C	1,800	144	solid	22.50	none	selec	int-gear
United BSW	2,250	144*	solid	27.20	s&l	selec	top worm
U.S E	2,200	132*	solid	27.20		ind-c	dbl chn
U.S H	2,500	144*	solid	27.20		ind-c	top worm
Universal D	2,800	132*	solid	25.60	lighting	selec	dbl chn
Velie 25	2,250	150*	solid	27.20	starting	selec	top worm
Wichita B	2,100	118*	solid	19.61	s&l-2	selec	dbl chn
Wilcox Q	2,000	150*	solid	29.00	lighting	selec	top worm
Wilson E	2,350	144	solid	27.20		selec	top worm
Witt-Will WD16	2,500	144	solid	27.20		selec	top worm

TRUCKS OF 2½-TON CAPACITY

Brinton F	$2,250	138	solid	27.20	lighting	selec	top worm
Chase B	2,475	160	solid	27.20		selec	top worm
Corbitt B	2,650	148	solid	27.20		selec	top worm
Dart CC	2,470	150	solid	27.20	none	selec	top worm
DeKalb D-2½	2,450	136*	solid	27.00	none	selec	top worm
Denby K	2,090	144*	solid	22.50	s&l-2	selec	int-gear
Doane	3,000-c	150	solid	29.00		selec	dbl chn
Gersix C	2,500	150*	solid	33.75	s&l-2	ind-c	top worm
Gramm-Bernstein	2,700	156	solid	29.00	s&l-2*	ind-c	top worm
Kelly-Springfield K36	2,750	144*	solid*	22.50	s&l-2	selec	top worm
Kelly-Springfield K35	2,750	144*	solid*	22.50	s&l-2	selec	dbl chn
Kisselkar	2,250	166	solid	29.00	s&l-2*	selec	top worm
Kleiber B	2,750	150*	solid	27.20	lighting	selec	top worm
Lange B	2,450	136*	solid	27.20	none	ind-c	dbl chn
Larrabee	2,300	152*	solid	27.20	s&l-2	selec	top worm
Maccar H	2,600	162	solid	32.40	none	selec	top worm
Moreland 15-C	2,550	144*	solid	32.40	lighting	selec	top worm
Old Reliable	2,750		solid	29.00		selec	dbl chn
Royal		132*	solid	25.60	starting	ind-c	top worm
Stegeman	2,500	144*	solid	29.45	s&l-2	selec	top worm
Sterling	2,800	156*	solid	29.00	lighting	selec	top worm
Thomas 40	2,700	150*	solid	27.20	lighting	selec	top worm
Tiffin MC	2,360	140	solid	27.20		selec	dbl chn
Tiffin MW	2,500	140	solid	27.20		selec	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting, lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* **-f,** *to front wheels;* **-4,** *to all four wheels.*

TRUCKS OF 2½-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Union.....B	$1,875	150	solid....	25.60	.....	selec..	int-gear
Wichita.....R	2,350	144	solid....	22.50	s&l-2....	selec..	top worm
Wisconsin.....C	2,500	156*	solid....	25.60	.....	selec..	top worm
W.S.....4	2,975	154	solid....	32.40	.....	.....	top worm-4
Zeitler & Lamson.....	2,450	160*	solid....	25.60	l&i*.....	ind-c..	top worm

TRUCKS OF 3-TON CAPACITY

A & B.....3T	$4,500	144	solid....	42.76	.....	elec...	int-g-f
Avery.....A	2,500-c	140	wood....	36.15	.....	selec..	dbl chn
Avery.....B	3,200	128	solid....	36.15	.....	selec..	dbl chn
Beech Creek.....3A	3,850	132	solid....	29.00	.....	selec..	bevel-4
Blair.....D	3,250	121*	solid....	29.00	.....	ind-c..	top worm
Chase.....X	.....	160	solid....	27.20	.....	selec..	top worm
Duplex.....D	.....	130*	solid....	32.40	s,l&i....	selec..	int-gear-4
F.W.D.....B	4,000	124	solid....	36.15	s&l.....	ind-c..	bevel-4
G. A. Schacht.....	3,200	168*	solid....	29.00	.....	selec..	top worm
Horner.....	3,200	145	solid....	32.40	.....	selec..	top worm
Nelson & LeMoon.....E3	2,950	opt.....	solid....	32.40	.....	selec..	top worm
Old Reliable.....	3,250	150	solid....	29.00	lighting..	selec..	top worm
Peerless.....TC3	.....	151*	solid....	32.40	.....	selec..	dbl chn
Republic.....T	.....	165*	solid....	29.00	s&l-2....	selec..	int-gear
Riker.....	3,500	150*	solid....	29.00	s&l-2....	selec..	top worm
Schleicher.....	3,500	150*	solid....	29.00	none.....	.....	dbl chn
Steele.....B	3,000	127*	solid....	40.00	lighting..	ind-c..	dbl chn
U.S.....D	2,700	144*	solid....	32.40	.....	ind-c..	dbl chn..
Universal.....A	3,400	132*	solid....	25.60	lighting..	selec..	dbl chn
White.....TAD	3,700	163	solid....	22.50	.....	selec..	dbl chn

TRUCKS OF 3½-TON CAPACITY

Acason.....	.....	168	solid....	29.00	.....	selec..	top worm
Acme.....C	.....	168*	solid....	32.40	lighting..	selec..	top worm
Armleder.....K-W	$3,500	156*	solid....	32.40	lighting..	selec..	top worm
Atterbury.....6D	3,175	167½	solid....	32.40	.....	selec..	top worm
Available.....3	3,300	168*	solid....	32.40	.....	selec..	top worm
Bessemer.....E	3,100	150*	solid....	32.40	.....	selec..	top worm
Brockway.....R	.....	164*	solid....	32.40	lighting..	selec..	top worm
Burford.....D-3	3,600	175*	solid....	32.40	lighting..	selec..	top worm
Couple Gear.....H-C	5,000	144*	solid....	53.00	light'g*..	elec...	bevel-4
Chase.....O	3,300	175	solid....	29.00	.....	selec..	top worm
Continental (C).....M	3,000	168*	solid....	32.40	.....	selec..	top worm
Corbitt.....A	3,200	168	solid....	32.40	.....	ind-c..	top worm
Dayton.....	3,400	.....	solid....	29.00	.....	selec..	worm
Dayton.....K	3,400	.....	solid....	36.15	.....	selec..	dbl chn
Diamond-T.....L	3,300	170*	solid....	32.40	.....	selec..	top worm
Federal.....L	2,800	146*	solid....	32.40	lighting..	selec..	top worm
Garford.....77-B	3,400	128*	solid....	29.00	s&l.....	selec..	top worm
G.M.C.....71	3,300	163*	solid....	32.40	none.....	selec..	top worm
Gramm-Bernstein.....	3,400	158*	solid....	29.00	s&l-2*...	ind-c..	top worm
Hall.....	2,800	144	solid....	32.40	lighting..	selec..	top worm*
Harrison.....C	.....	.....	solid....	32.40	.....	selec..	dbl chn
Harrison.....F	.....	.....	solid....	32.40	.....	selec..	dbl chn
Harvey.....W-H	2,950	160*	solid....	29.00	s&l-2....	selec..	top worm
Hurlburt.....	3,500	146*	solid....	29.00	lighting..	selec..	top worm
Kelly-Springfield....K-40	3,400	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
King.....	2,600	120	solid....	32.40	.....	ind-c..	dbl chn
Kleiber.....C	3,500	160*	solid....	32.40	lighting..	selec..	top worm
Knickerbocker.....A	3,500	128	solid....	32.40	lighting..	selec..	dbl chn
Krebs.....9D	3,250	180	solid....	32.40	.....	selec..	top worm
Maccar.....M	3,250	174	solid....	32.40	none.....	selec..	top worm
Mack.....AC	3,400	156*	solid....	40.00	s&l-2....	selec..	dbl chn
Menominee.....G	2,775	160*	solid....	32.40	none.....	.....	top worm
Packard.....3-D	3,400	156*	solid....	32.40	s&l-2....	prog..	top worm
Royal.....	.....	158*	solid....	29.00	starting..	ind-c..	top worm

TRUCKS OF 3½-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Selden.....N	$2,950	164	solid....	32.40	s&l-2 ...	selec..	top worm
Service.....170	3,000	170*	solid....	29.00	s&l-2*...	selec..	top worm
Service.....17S	3,250	170*	solid....	32.40	s&l-2*...	selec..	top worm
Signal.....M	3,000	168	solid....	32.40	.....	selec..	top worm
Standard.....60	2,850	144*	solid....	32.40	.....	selec..	top worm
Stegeman.....	3,000	156	solid....	33.75	s&l-2....	selec..	top worm
Sterling.....	3,400	158*	solid....	29.00	lighting..	selec..	top worm
United.....CSW	2,900	144*	solid....	32.40	s&l.....	selec..	top worm
U.S.....J	3,150	156*	solid....	32.40	.....	ind-c..	top worm
Velie.....26	3,350	172*	solid....	32.40	none....	selec..	top worm
Walter.....C	4,200	132*	solid....	30.65	.....	selec..	ext-g-4
Wichita.....O	3,250	165*	solid....	32.40	s&l-2....	selec..	top worm
Wilcox.....P	2,900	154*	solid....	29.00	lighting..	selec..	top worm
Zeitler & Lamson.....	3,150	170*	solid....	36.15	l&i.....	ind-c..	top worm

TRUCKS OF 4-TON CAPACITY

Blair.....E	$3,750	144*	solid....	32.40	.....	ind-c..	top worm
Kelly-Springfield....K-45	3,600	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
Kisselkar.....	2,850	168*	solid....	29.00	s&l-2*...	selec..	top worm
Moreland.....15-G	3,400	162*	solid....	36.15	lighting..	selec..	top worm
Old Reliable.....	3,750	.....	solid....	36.15	lighting..	selec..	top worm
Old Reliable.....	3,750	.....	solid....	36.15	lighting..	selec..	dbl chn
Packard.....4-D	3,800	156*	solid....	32.40	s&l-2....	prog..	top worm
Peerless.....TC4	.....	151*	solid....	32.40	.....	selec..	dbl chn
Riker.....	3,650	150*	solid....	29.00	s&l-2....	selec..	top worm
Standard.....40	3,025	144*	solid....	32.40	.....	selec..	dbl chn
Steele.....BA	3,500	127*	solid....	40.00	lighting .	ind-c..	dbl chn
United.....DSW	3,300	144*	solid....	36.15	s&l.....	selec..	top worm

TRUCKS OF 5-TON CAPACITY

A & B.....5T	$4,750	144	solid....	42.76	.....	elec...	int-g-f....
Available.....5	4,400	168*	solid....	32.40	.....	selec..	top worm
Avery.....B	4,500	128	solid....	44.20	.....	selec..	dbl chn
Bessemer.....H	3,600	150	solid....	32.40	.....	selec..	top worm
Blair.....F	4,250	144*	solid....	32.40	.....	ind-c..	top worm
Couple Gear.....AC	5,350	144*	solid....	53.00	lighti'g*.	elec...	bevel-4
Dayton.....M	4,500	.....	solid....	44.20	.....	selec..	dbl chn
Diamond-T.....R	4,200	170*	solid....	32.40	.....	selec..	top worm
Federal.....W	.....	156*	solid....	29.00	s,l&i*...	selec..	top worm
Garford.....68	4,300	128*	solid....	36.15	none....	selec..	dbl chn
G.V. Mercedes.....FV	.....	192½	solid....	29.00	.....	selec..	int-gear
G.M.C.....101	3,850	163*	solid....	32.40	none....	selec..	top worm
Gramm-Bernstein.....	4,300	168*	solid....	32.40	s&l-2*...	ind-c..	top worm
Hall.....	3,400	144	solid....	32.40	lighting..	selec..	dbl chn
Harvey.....W-K	3,600	160*	solid....	32.40	s&l-2....	selec..	top worm
Horner.....	4,200	156	solid....	44.20	.....	selec..	top worm
Hurlburt.....	4,250	156*	solid....	33.75	lighting..	selec..	top worm
Kelly-Springfield....K-50	4,250	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
Kisselkar.....	3,350	180	solid....	29.00	s&l-2*...	selec..	top worm
Kleiber.....D	4,500	170*	solid....	44.20	lighting..	selec..	top worm
Knickerbocker.....C	4,500	148*	solid....	32.40	lighting..	selec..	dbl chn
Moreland.....16-J	3,800	180*	solid....	36.15	lighting..	selec..	worm
Old Reliable.....	4,500	150*	solid....	36.15	lighting..	selec..	dbl chn
Peerless.....TC5	.....	151*	solid....	32.40	.....	selec..	dbl chn
Pierce-Arrow.....	4,500	168*	solid....	38.25	.....	selec..	top worm
Royal.....	.....	168*	solid....	36.15	starting..	ind-c..	top worm
Saurer.....L	4,800	153½	solid....	34.28	none....	selec..	dbl chn
Schleicher.....	4,500	150*	solid....	40.00	none....	selec..	dbl chn
Service.....200	4,000	170*	solid....	32.40	s&l-2*...	selec..	top worm
Signal.....R	4,000	180	solid....	32.40	.....	selec..	top worm
Standard.....50	3,400	144*	solid....	29.00	.....	selec..	topworm
Steele.....A	4,000	127*	solid....	40.00	lighting..	ind-c..	dbl chn
Stegeman.....	4,000	170	solid....	33.75	s&l-2....	selec..	top worm
Sterling.....	4,500	168	solid....	36.15	lighting..	selec..	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting, lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

TRUCKS OF 5-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Tiffin.....RW	$4,250	168	solid....	33.75	s&l-2....	selec..	top worm
United.....ESW	3,900	144*	solid....	41.62	s&l-2*...	selec..	top worm
U.S.....K	4,000	168*	solid....	36.15	.....	ind-c..	top worm
White.....TCD	4,500	169	solid....	29.00	.....	selec..	dbl chn
Wichita.....Q	3,850	165*	solid....	32.40	s&l-2....	selec..	top worm
Zeitler & Lamson.....	4,150	180*	solid....	41.62	l&i*.....	ind-c..	top worm

TRUCKS OF 5½-TON CAPACITY

Maccar.....U	.....	186	solid....	32.40	.....	selec..	top worm
Mack.....AC	$4,000	156*	solid....	40.00	s&l-2....	selec..	dbl chn

TRUCKS OF 6-TON CAPACITY

Doane.....	$4,500-c	178	solid....	36.15	.....	selec..	dbl chn
Garford.....69	4,500	128*	solid....	41.61	none.. ..	selec..	dbl chn
Gramm-Bernstein.....	4,500	168*	solid....	32.40	s&l-2*...	ind-c..	top worm
G.V.-Mercedes.....S.V.	.....	192¼	solid....	29.00	.....	selec..	int-gear
Kelly-Springfield....K-60	4,500	150	solid*...	32.40	s&l-2....	selec..	dbl chn
Peerless.....TC6	.....	151*	solid....	32.40	.....	selec..	dbl chn
Royal.....	.....	158	solid....	42.20*	.....	ind-c..	top worm*
Tiffin.....SW	4,550	168	solid....	33.75	s&l-2....	selec..	top worm

TRUCKS OF 6½-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Saurer.....M	$5,800	156½	solid....	34.28	none....	selec..	dbl chn

TRUCKS OF 7-TON CAPACITY AND OVER

Dayton.....E	$4,950	.....	solid....	44.20	.....	selec..	dbl chn
Hurlburt.....	5,000	156*	solid....	33.75	lighting..	selec..	top worm
Mack.....AC	4,500	156*	solid....	40.00	s&l-2....	selec..	dbl chn
Old Reliable.....	5,000	150	solid....	41.62	lighting..	selec..	dbl chn
Royal.....	.....	158*	solid....	44.20	.....	ind-c..	dbl chn
Sterling.....	4,750	168	solid....	36.15	lighting..	selec..	dbl chn
Walter.....B	4,750	162*	solid....	30.65	.....	selec..	ext-g-4

TRACTORS

Knox.....35	$4,500	108½	solid....	40.00	s&l-2....	selec..	dbl chn
Knox.....36	5,000	108½	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	3,400	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	4,000	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	4,500	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mercury-Bulley.....A	3,400	171	solid....	29.00	lighting..	ind-c..	dbl chn
Transport.....T	2,500	80	solid....	19.61	.....	selec..	top worm
Watson.....	3,600	80	solid....	32.40	.....	selec..	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* 4, *to all four wheels.*

Save These Pages

IN KEEPING with its previous custom Motor Age publishes the specifications of the principal makes of gasoline and electric commercial vehicles. Each year which has witnessed this collation of technical data has seen it more and more complete. For 1917 this tabulation covers twenty-one pages. These specifications are prepared for the information of prospective buyers of motor trucks, who require some means of ascertaining what vehicles are available, their capacities, types, their designs and their prices.

Will Aid Many Classes

These compilations are for the owner of motor trucks, whether at present in the market for new or additional equipment, or, if not, to aid him in keeping abreast of developments, so that when the time comes for further investment in commercial motor vehicles, he will be informed—will buy intelligently.

These specifications are also for the dealer in motor trucks of all types. They offer the means of informing him with regard to their comparative merits. This reference, being complete, enables the dealer to determine the capacities, prices and construction of competing makes, so that in case he wishes to change his line or add vehicles of another make or type to his stock, he may be sure that he has not overlooked any of the recognized makes. It enables him to obtain an accurate focus on the relation of his line to motor trucks in general.

Likewise, these specifications are valuable for the manufacturer, for the engineer, for the sales executives and others of the producing organization, who often are in urgent need for a reliable and complete reference to standard products in their line. Besides this, the industry requires some standard reference for a vast amount of data, the need for all of which cannot always be told in advance.

Therefore, it has been with the thought in mind of the needs and requirements of its readers, among which are all the persons mentioned in preceding paragraphs, that Motor Age has prepared and now offers the directory of 211 makers of vehicles, with the names and addresses of these makers, as well as the capacities of their product; a condensed buyers' guide of the principal makes, grouped according to the tons capacity and segregated according to the forms of power; a table of specifications covering 386 different gasoline and gasoline-electric chassis models of 137 manufacturers, specifications and buyers' buide of thirty-seven electric vehicles of the commercial types, together with a complete glossary of terms for both gasoline and electric specification tables and other data such as will be required by those in any way interested in commercial vehicles for 1917.

Many Changes Made

Much progress has been made in the commercial field during the last year, as well as the passenger car field, and it is a physical impossibility to keep all of the data required in the course of the business routine at one's fingers' ends, so the information on the preceding and following pages should be preserved for reference during the 1917 season. The publication from year to year has proven the worth of such information as those who have come to use it in the past will testify.

Technical Specifications of Gaso

Details of 386 Gasoline and Gasoline-Electric Motor Truck Chassis Engine, Transmission, Control and Equipment

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR								
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
							Front	Rear							Water Circulation	Radiator Core and Case	Type	Make	Spark Advance
A & B.....3 T	6,000	$4,500	144	rolled-c..	semi-flx .	solid....	48x3½d	48x3½d	wood-ov.	3	4-5½x4½	42.76	pairs....	right...	gear...	fin-sheet...	dual..	Bosch.....	hand...
A & B.....5 T	10,000	4,750	144	rolled-c..	semi-flx..	solid....	48x3½d	48x5d	wood-ov.	3	4-5½x4½	42.76	pairs....	right...	gear...	fin-sheet...	dual..	Bosch.....	hand...
Acason.....2	4,000	.....	150	pr-steel..	semi-flx..	solid....	34x4	36x3½d	wood-ov	3	4-4½x5¾	29.00	pairs....	left....	cent...	fin-cast....	sing...	Eisemann.	hand...
Acason.....	7,000	.....	168	pr-steel..	semi-flx..	solid....	36x5	38x5d	wood-ov.	3	4-4¼x5¾	29.00	pairs....	left....	cent...	fin-cast....	sing...	Eisemann.	hand...
Acme.....B	2,000	1,500	128	pr-steel..	semi-flx..	pneu....	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	fin-sheet...	sing...	Eisemann.	hand...
Acme.....A	4,000	2,100	148*	pr-steel..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-sheet...	sing...	Eisemann.	fixed...
Acme.....C	7,000	.....	168*	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Eisemann.	fixed...
Armleder.....HW2	4,000	2,800	166*	pr-steel..	semi-flx..	solid....	36x4	36x7*	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	cell-sheet..	sing...	Bosch.....	hand...
Armleder.....KW	7,000	3,500	156*	rolled-I..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Bosch.....	hand...
Atlas.....17	1,000	690	106	pr-steel..	.....	pneu....	30x3½	30x3½	wood-ov.	2	4-3¼x5	16.92	block...	right...	thermo.	fin-sheet...	sing...	Dixie.....	hand...
Atterbury.....6B	2,000	1,775	140½	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	fin-cast....	sing...	Bosch.....	fixed...
Atterbury.....6R	3,000	1,875	140½	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	fin-cast....	sing...	Bosch.....	fixed...
Atterbury.....6C	4,000	2,375	153½	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-cast....	sing...	Bosch.....	fixed...
Atterbury.....6D	7,000	3,175	167½	pr-steel..	flexible..	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	dual..	Bosch.....	hand...
Autocar.....21F	4,000	1,650	97	rolled-c.	.....	solid*...	34x4*	34x5*	wood-ov.	2	2-4¾x4½	18.10	sing.....	top....	cent...	cell-sheet..	sing...	Bosch.....	fixed...
Available.....1	2,000	1,700	132*	rolled-c..	semi-flx..	solid....	36x3½	36x4	wood-ov.	3	4-3¾x5	22.50	block...	right...	thermo.	cell-sheet..	sing...	Bosch.....	fixed...
Available.....2	4,000	2,250	156*	rolled-c..	semi-flx..	solid....	36x4	36x7	wood-ov.	3	4-4¼x5½	27.20	block...	left....	cent...	cell-sheet..	sing...	Bosch.....	fixed...
Available.....3	7,000	3,300	168*	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-ov.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	sing...	Bosch.....	fixed...
Available.....5	10,000	4,400	168*	rolled-c..	semi-flx..	solid....	36x6	40x6d	wood-ov.	3	4-4½x5½	32.40	pairs....	right....	cent...	cell-sheet..	sing...	Bosch.....	fixed...
Avery.....C	2,000	1,690	128	.....	.....	solid....	34x3½	34x5	.....	.....	4-4¼x5½	27.20	block...	left....	cent...	fin-sheet...	dual..	Heinze....	hand...
Avery.....B	4,000	2,700	128	.....	.....	solid....	36x4	36x3½d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	fin-sheet...	dual..	Eisemann.	auto....
Avery.....B	6,000	3,200	128	.....	.....	solid....	38x5	38x4d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	cell-sheet..	dual..	Eisemann.	auto....
Avery.....A	6,000	2,500-c	140	.....	.....	wood....	38x5	38x4d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	fin-sheet...	dual..	Eisemann.	auto....
Avery.....B	10,000	4,500	128	.....	.....	solid....	38x6	38x5d	.....	.....	4-5¼x5¾	44.20	pairs....	opp....	cent...	cell-sheet..	dual..	Eisemann.	auto....
Beech Creek.....3A	6,000	3,850	132	rolled-c..	flexible..	solid....	36x6	36x6	wood-sq.	3	4-4¼x5¾	29.00	pairs....	left....	cent...	cell-sheet..	sing...	Eisemann.	hand....
Bessemer.....G	2,000	975	124	pr-steel..	semi-flx..	solid....	35x3	35x3½	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	cell-sheet..	sing...	Bosch.....	hand....
Bessemer.....D	4,000	2,200*	146*	pr-steel..	semi-flx..	solid....	37x4	37x4d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	cell-cast...	sing...	Bosch.....	hand....
Bessemer.....E	7,000	3,100	150*	pr-steel..	semi-flx..	solid....	37x5	37x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch.....	hand....
Bessemer.....H	10,000	3,600	150	pr-steel..	semi-flx..	solid....	37x6	37x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch.....	hand....
Blair.....C	4,000	2,850	121*	pr-steel..	flexible..	solid....	34x4	34x3½d	wood-sq.	3	4-4½x5¾	29.00	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch.....	fixed....
Blair.....D	6,000	3,250	121*	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5¾	29.00	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch.....	fixed....
Blair.....E	8,000	3,750	144*	pr-steel..	flexible..	solid....	36x5	36x5d	wood-sq.	3	4-4½x6¾	32.40	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch.....	auto....
Blair.....F	10,000	4,250	144*	pr-steel..	flexible..	solid....	36x6	36x6d	wood-sq.	3	4-4½x6¾	32.40	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch.....	auto....
Brinton.....H	1,500	950	115	.....	semi-flx..	pneu*...	33x4	33x4*	wood-ov.	2	4-3¼x5	16.92	block...	left....	gear...	cell-sheet..	sing...	.....	fixed....
Brinton.....F	5,000	2,250	138	.....	semi-flx..	solid....	36x4	36x6	wood-ov.	3	4-4⅛x5	27.20	block...	left....	gear...	cell-sheet..	sing...	.....	fixed....
Briscoe.....4-24	1,000	625	104	pr-steel..	rigid....	pneu....	30x3½	30x3½	wood-ov.	2	4-3¼x5½	16.92	block...	right...	thermo.	z-z-t-sheet.	sing...	Splitdorf...	hand....
Brockway.....O	2,000	1,450	124*	pr-steel..	flexible..	solid....	34x3½	34x4	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	fin-cast....	sing...	Bosch.....	fixed....
Brockway.....J-2	3,000	1,825	124*	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	fin-cast....	sing...	Bosch.....	fixed....
Brockway.....K-2	4,000	2,125	140*	pr-steel..	flexible..	solid....	36x4	36x6*	wood-sq.	3	4-4¼x5¼	27.20	block...	left....	cent...	fin-cast....	sing...	Bosch.....	fixed....
Brockway.....R	7,000	.....	164*	pr-steel..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Bosch.....	hand....
Burford.....O-3	4,000	2,250	144*	pr-steel..	rigid....	solid....	36x3½	36x3½d	wood-sq.	3	4-3¾x5½	22.50	block...	right...	cent...	fin-cast....	sing...	Eisemann.	fixed....
Burford.....D-3	7,000	3,600	175*	pr-steel..	rigid....	solid....	38x5	38x5d	wood-sq.	3	4-4½x6¾	32.40	block...	left....	cent...	fin-cast....	sing...	Eisemann.	fixed....
Couple Gear.....HC	7,000	5,000	144*	rolled-c..	semi-flx..	solid....	36x4d	36x4d	pr-steel-d	5	4-5¾x6	53.00	sing.....	opp....	gear...	cell-sheet..	dual..	Eisemann.	2-pt.-fix.
Couple Gear.....AC	10,000	5,350	144*	rolled-c..	semi-flx..	solid....	36x5d	36x5d	pr-steel-d	5	4-5¾x6	53.00	sing.....	opp....	gear...	cell-sheet..	dual..	Eisemann.	2-pt.-fix.
Chase.....A	2,000	1,650	.....	pr-steel..	.....	solid....	36x3½	36x5	wood-ov.	3	4-3½x5½	19.61	block...	.....	cent...	fin-sheet...	sing...	Bosch.....	fixed....
Chase.....C	3,000	1,950	138	pr-steel..	.....	solid....	36x3½	36x3½d	wood-ov.	3	4-3½x5½	19 61	block...	.....	cent...	fin-cast....	sing...	Bosch.....	fixed....
Chase.....B	5,000	2,475	160	pr-steel..	.....	solid....	36x4	36x4d	wood...	3	4-4¼x5½	27.20	block...	.....	cent...	fin-cast....	sing...	Bosch.....	fixed....
Chase.....X	6,000	.....	160	pr-steel..	.....	solid....	36x4	36x5d	wood...	3	4-4¼x5½	27.20	block...	.....	cent...	fin-cast....	sing...	Bosch.....	fixed....
Chase.....O	7,000	3,300	175	pr-steel..	.....	solid....	36x5	36x5d	wood-ov.	3	4-4¼x6	29.00	block...	.....	cent...	fin-cast....	sing...	Bosch.....	fixed....
Collier.....M	1,500	800	118	rolled-c.	semi-flx..	pneu....	33x4	33x4	wood-ov.	3	4-3¾x5	16.92	block...	right...	thermo.	z-z-t-sheet.	sing...	Conn.....	hand....
Columbia.....E	4,000	1,750	144*	pr-steel..	.....	solid....	36x4	36x6	wood-sq.	3	4-4⅛x5½	27.20	block...	right...	cent...	z-z-t-cast..	sing...	Eisemann.	hand....
Commerce.....N	1,500	975-c	120	pr-steel..	flexible..	pneu....	34x4	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	fin-cast....	sing...	Eisemann.	fixed....
Commerce.....E	2,000	1,175	126	pr-steel..	flexible..	solid....	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	fin-cast....	sing...	Remy.....	hand....
Continental (C).....FL	2,000	1,550	144	.....	.....	solid....	34x3	36x4	.....	3	4-3¾x5½	22.50	pairs....	left....	cent...	fin-cast....	sing...	Bosch*....	fixed....
Continental (C).....HL	3,000	1,750	144	.....	.....	solid....	34x3½	36x5	.....	3	4-3½x5½	22.50	pairs....	left....	cent...	fin-cast....	sing...	Bosch*....	fixed....
Continental (C).....J	4,000	2,100	146	.....	.....	solid....	36x4	36x4d	.....	3	4-4¼x5½	27.20	pairs....	left....	cent...	cell-cast...	sing...	Bosch*....	fixed....
Continental (C).....M	7,000	3,000	168*	.....	.....	solid....	36x5	36x5d	.....	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch*....	fixed....
Corbitt.....D	3,000	2,150	138	pr-steel..	rigid....	solid....	36x3½	36x5	wood-sq.	3	4-3¾x5½	22.50	block...	right...	cent...	fin-cast....	sing...	Eisemann.	hand....
Corbitt.....C	4,000	2,400	148	pr-steel..	rigid....	solid....	36x3½	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block...	right...	cent...	fin-cast....	sing...	Eisemann.	hand....
Corbitt.....B	5,000	2,650	148	pr-steel..	rigid....	solid....	36x4	36x4d	wood-sq.	3	4-4¼x5½	27.20	block...	right...	cent...	fin-cast....	sing...	Eisemann.	hand....

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price, -c,** *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes, -d,** *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular, cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

line Commercial Vehicles for 1917

Produced by 137 American Manufacturers, with Full Particulars of —Two Steam Models of One Maker Included

MOTOR											TRANSMISSION								BRAKES		CONTROL		Name and Model
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM				GEARSET											
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	
								Scheb..	grav.	seat..	none..	elec..	amid...	2	28.00–1	int-g-f..	rad-rd..	rad-rd..	ex-r-w..	ex-f-w..	right.	right.	A & B.....3T
								Scheb..	grav.	seat..	none..	elec..	amid...	2	28.00–1	int-g-f..	rad-rd..	rad-rd..	ex-r-w..	ex-f-w..	right.	right.	A & B.....5T
			cent..	motor..	Wauk'a..	1,100	17½	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	4	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Acason.....2
			cent..	motor..	Wauk'a..	1,100	13½	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	4	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Acason.....
			cent..	motor..	Pierce...	1,700	22	Ray...	vac..	.....	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Acme.....B
lighting.		opt..	cent..	motor..	Pierce...	1,300	17	Ray...	vac..	.....	dry-d..	selec.	unit-m.	3	8.50–1	worm..	springs.	springs.	int.....	int.....	.....	cent..	Acme.....A
lighting.		opt..	cent..	motor..	Pierce...	1,200	14	Ray...	vac..	.....	dry-p..	selec.	amid...	3	10.25–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Acme.....C
lighting.		60.00	cent..	drive-s.	Pierce*..	1,200	16	Scheb..	grav.	seat..	wet-d.	selec.	unit-m.	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Armleder.....HW2
lighting.		60.00	cent..	motor*	Pierce...	1,100	14	Scheb..	grav.	seat..	wet-d.	selec.	unit-m.	3	8.75–1	worm..	rad-rd..	springs.	int-r-w.	ext-sht.	left..	cent..	Armleder.....KW
								Carter..	grav.	seat..	wet-d.	selec.	unit-m.	3	4.75–1	sp-bev..	springs.	springs.	ext-r-w.	int-r-w.	left..	cent..	Atlas.....17
			cent..	motor..	Pierce...	1,200	16½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury.....6B
			cent..	motor..	Pierce...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury.....6R
			cent..	motor..	Pierce...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury.....6C
			cent..	motor..	Pierce...	1,125	13	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	10.33–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury.....6D
								Stmbg..	.....	seat..	dry-p..	prog.	amid...	3	7.14–1	db-red..	springs.	springs.	int-r-w.	ext-r-w.	right.	right.	Autocar.....21F
			none					Stmbg.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Available.....1
			none					Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Available.....2
			cent	motor..	Pierce...	1,300	15	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	10.33–1	worm..	rad-rd..	springs.	int.....	int.....	left..	cent..	Available.....3
			cent	motor..	Pierce...	1,175	12	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	11.75–1	worm..	rad-rd..	springs.	int.....	int.....	left..	cent..	Available.....5
			cent	motor..		1,200	15	Ray...	.....	.....	dry-d..	selec.	unit-m.	3	7.75–1	dbl chn.	.....	rad-rd..	.....	.....	left..	cent..	Avery.....C
			l-b..	motor..		1,200	14½	Ray...	.....	.....	dry-d..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery.....B
			cent..	motor..		1,200	13	Ray...	.....	.....	dry-p..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery.....B
			cent..	motor..		1,200	12	Ray...	.....	.....	dry-d..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery.....A
			cent..	motor..		1,000	10	Scheb..	.....	.....	wet-d.	selec.	unit-j..	3	12.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery.....B
			cent..	motor..	Wauk'a..	1,000	12	King...	vac..	seat..	dry-p..	selec.	amid...	6	8.03–1	bevel-4.	rad-rd..	springs.	ext-r-w.	ext-sht.	rt*...	cent..	Beech Creek.....3A
					none			Scheb..	grav.	seat..	dry-d.	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent	Bessemer.....G
			cent..	motor..	Pierce			Ray...	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Bessemer.....D
			cent..		Pierce			Ray...	grav.	.....	cone..	selec.	amid...	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent	Bessemer.....E
			cent..	motor..	Pierce				grav.	seat..	cone..	selec.	amid...	3	13.00–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	cent..	Bessemer.....H
			cent..	motor..	Wauk'a..	1,060	14	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	7.67–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair.....C
			cent..	motor..	Wauk'a..	970	12	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	8.67–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair.....D
			cent..	motor..	Wauk'a..	870	10	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	9.33–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair.....E
			cent..	motor..	Wauk'a..	870	10	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	9.33–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair.....F
lighting.			cent..	motor..					grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	.....	springs.	int.....	ext.....	.....	cent..	Brinton.....H
lighting.		stock..	cent..	motor..					grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int.....	ext.....	.....	cent	Brinton.....F
s,l&i..	Splitdf..	stock..							grav.	dash.	cone..	selec.	unit-x..	3	4.23–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent	Briscoe.....4-24
			suct..	motor..	Mon'rch.	1,400	18	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.90–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway.....O
			suct..	motor..	Mon'rch.	1,250	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Brockway.....J-2
			suct..	motor..	Mon'rch.	1,250	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.66–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway.....K-2
lighting.			suct..	motor..	Mon'rch.	1,200	12	Scheb..	grav.	seat..	dry-d..	selec.	amid...	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway.....R
lighting.		stock..			none	1,200	15	Zenith..	grav.	dash.	cone..	selec.	unit-m.	3	8.50–1	int-g...	springs.	springs.	ext-sht.	ext-r-w.	right.	cent..	Burford.....O-3
lighting.		stock..	cent..	motor..	Wauk'a..	1,000	13	Zenith..	vac..	seat..	dry-d..	selec.	amid...	4	13.10–1	worm..	rad-rd..	springs.	-r-w..	int-r-w.	right.	right.	Burford.....D-3
lighting*		stock..			Her-Sp	1,500		Stmbg..	grav.	seat..		elec..		1	25.00–1	bevel-4.	rad-rd..	rad-rd..	.....	ext-4-w.	right.	c & r	Couple Gear.....HC
lighting*		stock..	c't*..	f-whl*..	Her-Sp*	1,500		Stmbg..	grav.	seat..	.....	elec.	amid...	1	25.00–1	bevel-4.	rad-rd..	rad-rd..	.....	ext-4-w.	right.	cent..	Couple Gear.....AC
			suct..	motor..	Mon'rch.	1,200	18	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Chase.....A
			suct..	motor..	Mon'rch.	1,000	15	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Chase.....C
			suct..	motor..	Mon'rch.	1,000	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Chase.....B
			suct..	motor..	Mon'rch.	1,000	10	Stmbg..	grav.	.....	wet-d.	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Chase.....X
			suct..	motor..	Mon'rch.	1,000	10	Stmbg..	grav.	seat..	wet-d.	selec.	unit-m.	4	.....	worm..	springs.	t-arm..	int.....	int.....	right.	cent..	Chase.....O
s,l&i...	Dyneto..	stock..			none		35	Carter*	grav.	.....	dry-p.	selec.	unit-m.	3	6.00–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent	Collier.....M
none...			suct..	motor..	Mon'rch.	1,200	14	Shkspr.	grav.	.....	cone..	selec.	amid...	3	9.45–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Columbia.....E
s,l&i..		100.00			none	1,630	25	Zenith..	grav.	seat..	cone..	selec.	unit-m.	3	6.00–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Commerce.....N
s&l-2...	Remy...	stock..	cent..	d-shft..	Pierce...	1,383	20	Zenith..	vac..	seat..	cone..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Commerce.....
			suct..	motor..				Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C).....FL
			suct..	motor..				Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C).....HL
			suct..	motor..				Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C).....J
			suct..	motor..			18	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	10.50–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C).....M
			cent..	motor..	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Corbitt.....D
			cent..	motor..	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Corbitt.....C
			cent..	motor..	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Corbitt.....B

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; sp'gs, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheel base in Inches	FRAME		TIRES			Wheels	MOTOR							IGNITION		
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		Type	Make	Spark Advance
							Front	Rear							Water Circulation	Radiator Core and Case			
Corbitt....A	7,000	$3,200	168	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	right...	cent...	fin-cast....	sing...	Eisemann..	hand....
Corliss....A	1,000	800-c*	100	pr-steel..	rigid....	pneu....	31x4	31x4	wood-ov.	2	4-3½x4½	15.64	block...	left....	thermo.	fin-sheet...	sing...	Dixie.....	hand....
Croce....17	1,000	825	108	pr-steel..	.....	p. & s...	32x4	32x4	wood-sq.	2	4-3½x5	16.92	block...	left....	cent...	sq-t-sheet..	sing...	Bosch.....	fixed....
Crowther-Duryea....	1,200	600-c	110	pr-steel..	semi-flx..	pneu....	32x3½	32x3½	wood-ov.	4	4-3⅞x4¼	22.50	sing.....	head...	thermo.	cell-sheet..	dual..	Dixie.....	hand....
Dart....B-B	1,500	1,200	124	pr-steel..	flexible..	solid....	34x3	34x3½	wood-sq.	3	4-3½x5¼	19.61	block...	right...	thermo.	cell-sheet..	sing..	Eisemann..	fixed....
Dart....E	3,000	1,800	130	pr-steel..	flexible..	solid....	34x3½	34x5	wood-sq.	3	4-3½x5¼	22.50	block...	right...	thermo.	cell-sheet..	sing..	Eisemann..	fixed....
Dart....C-C	5,000	2,470	150	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	27.20	block...	right...	cent...	cell-sheet..	sing..	Eisemann..	fixed....
D-E....Junior	1,250	895	108	pr-steel..	rigid....	pneu....	33x4	33x4	wood-ov.	2	4-3½x4½	15.64	block...	right...	thermo.	fin-sheet...	sing..	Dixie.....	hand....
D-E....Senior	2,000	1,450	128*	pr-steel..	rigid....	solid....	34x3½	34x4	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	fin-sheet...	sing..	Dixie.....	hand....
DeKalb....D-1½	4,000	2,100	134*	pr-steel..	flexible..	solid....	34x4	36x5	wood-sq.	3	4-4½x5¼	27.20	block...	left....	cent...	cell-sheet..	sing..	Eisemann..	hand....
DeKalb....D-2½	5,000	2,450	136*	pr-steel..	flexible..	solid....	36x4	36x6	wood-sq.	3	4-4⅞x5¼	27.20	block...	left....	cent...	cell-sheet..	sing..	Eisemann..	hand....
Denby....R	2,000	900	119	rolled-c..	semi-flx .	pneu*...	34x4½*	34x4½*	wood-sq.	2	4-3½x4½	15.64	block...	right...	thermo.	cell-cast...	sing...	Dixie.....	fixed....
Denby....G	3,000	1,575	120*	pr-steel..	semi-flx..	solid....	35x3½	35x5	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	cell-cast...	sing...	Eisemann..	fixed....
Denby....H	4,000	1,790	144*	pr-steel..	semi-flx..	solid....	36x3½	36x3½d*	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	cell-cast...	sing...	Eisemann..	fixed....
Denby....K	5,000	2,090	144*	pr-steel..	semi-flx..	solid....	36x4	36x4d*	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	cell-cast...	sing...	Eisemann..	fixed....
Dispatch....G	1,200	1,150	120	wood....	flexible..	pneu....	36x3½	36x3½	wood-ov.	3	4-3⅞x5	22.50	block...	left....	thermo.	cell-sheet..	sing..	Bosch.....	hand....
Doane....	5,000	3,000-c	150	rolled-c..	flexible..	solid....	36x4	36x7	wood-sq.	3	4-4½x5⅜	29.00	pairs....	right...	cent...	fin-cast....	sing..	Bosch.....	auto....
Doane....	12,000	4,500-c	178	rolled-I..	flexible..	solid....	36x6	38x6d	wood-sq	3	4-4¾x6¾	36.15	pairs....	left....	cent...	fin-cast....	sing..	Bosch.....	auto....
Dorris....I-B-4	1,500	1,900	132	pr-steel..	semi-flx..	pneu....	36x4	36x4½	wood-ov.	3	4-4½x5	30.65	pairs....	head...	cent...	z-z-t-sheet.	dual..	Bosch.....	hand....
Dorris....I-B-W	4,000	1,990	132	pr-steel..	semi-flx..	pneu....	36x4	36x4d	wood-sq.	3	4-4½x5	30.65	pairs....	head...	cent...	z-z-t-sheet.	sing..	Bosch.....	hand....
Ellsworth....25-A	1,000	695-c	108	pr-steel..	flexible..	pneu....	30x3½	30x3½	wood-ov.	2	4-3½x5	16.92	block...	right...	thermo.	sq-t-sheet..	sing..	storage....	hand..
Federal....S	?,000	.....	132	pr-steel..	semi-flx..	solid*...	34x3*	34x4*	wood-ov.	5	4-3½x5½	19.61	block...	right...	cent...	fin-sheet...	sing..	Eisemann..	fixed....
Federal....J-M	3,000	1,800	144*	pr-steel..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-cast...	sing..	Eisemann..	fixed....
Federal....O-P	4,000	2,100	144*	pr-steel..	semi-flx..	solid....	36x4	36x7*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-cast...	sing..	Eisemann..	fixed....
Federal....L	7,000	2,800*	146*	rolled-c..	semi-flx.	solid....	36x5	36x5d	wood-sq*	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Eisemann..	fixed....
Federal....W	10,000	.....	156*	rolled-c..	semi-flx	solid....	36x6	40x6d*	cast-hol.	5	4-4½x5½	29.00	block...	right...	cent...	fin-sheet*..	sing..	Eisemann..	fixed....
Forschler....	2,000	1,650	130	rolled-c..	flexible..	solid*...	36x3	36x4	wood-sq.	3	4-3½x5	19.61	block...	right...	cent...	sq-t-sheet..	sing..	Bosch.....	fixed....
Forschler....	4,000	2,250	140*	rolled-c..	flexible..	solid*...	34x3½	34x5	wood-sq.	3	4-4¼x5¼	27.20	block...	left....	cent...	sq-t-sheet..	sing..	Bosch.....	fixed....
F. W. D....B	6,000	4,000	124	pr-steel..	.....	solid....	36x6	36x6	wood-ov.	3	4-4½x5½	36.15	pairs....	opp....	cent...	sq-t-sheet.	sing..	Eisemann..	hand....
Garford....75	2,000	1,450	120	pr-steel..	semi-flx	p. & s...	34x4½	36x3½	wood-ov.	3	4-3½x5½	19.61	block...	right...	thermo.	cell-sheet..	sing..	Dixie.....	hand....
Garford....66	3,000	1,800	142*	pr-steel..	semi-flx..	solid....	36x3½	36x5	wood-ov.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Dixie.....	hand....
Garford....70	4,000	2,300	142*	pr-steel..	semi-flx..	solid....	36x4	36x4d	wood-ov.	3	4-4½x5½	29.00	block...	right...	cent...	fin-cast....	sing..	Dixie.....	hand....
Garford....77-B	7,000	3,400	128*	pr-steel..	semi-flx..	solid....	36x5	40x5d	wood-ov.	3	4-4½x6	29.00	block...	right...	cent...	cell-sheet..	sing..	Bosch.....	hand....
Garford....68	10,000	4,300	128*	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-ov.	3	4-4¾x5½	36.15	pairs....	opp....	cent...	fin-cast....	sing..	Bosch.....	hand....
Garford....69	12,000	4,500	128*	pr-steel..	semi-flx..	solid....	36x6	40x7d	wood-ov.	3	4-5 1/10x5½	41.61	pairs....	opp....	cent...	fin-cast....	sing..	Bosch.....	hand....
G. A. Schacht....	3,000	2,650	138*	rolled-c..	flexible..	solid....	38x3½	38x6	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	cell-sheet..	sing..	Bosch.....	hand....
G. A. Schacht....	4,000	2,800	144*	rolled-c..	flexible..	solid....	38x4	38x4d	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	z-z-t-cast.	sing..	Bosch.....	hand....
G. A. Schacht....	6,000	3,200	168*	rolled-c..	flexible..	solid....	38x5	38x5d	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	z-z-t-cast.	sing..	Bosch.....	hand....
G. V.-Mercedes....F.V.	12,000	.....	192¼	pr-steel..	rigid....	solid....	34x5	40x6d	cast-d...	3	4-4½x5 9/10	29.00	pairs....	head...	cent...	sq-t-cast..	sing..	Bosch.....	fixed..
Gersix....C	5,000	2,500	150*	rolled-c..	rigid....	solid....	36x4	36x7	wood-ov.	4	6-3¾x5½	33.75	block...	left....	cent...	cell-cast...	sing..	Westghs...	hand....
Globe....	2,500	1,375	130*	rolled-c..	semi-flx..	solid....	34x3½	34x4	wood-sq.	3	6-3¼x4½	25.39	block...	left....	cent...	fin-cast....	sing..	Dixie.....	fixed..
G. M. C....15	1,500	1,090	122	pr-steel..	rigid....	pneu....	35x5	35x5	wood-ov.	3	4-3½x5	19.61	block...	right...	cent...	fin-sheet...	sing..	Eisemann..	hand....
G. M. C....21	2,000	.....	136	pr-steel..	semi-flx	solid....	34x3½	34x5	wood-ov.	3	4-3½x5	22.50	block...	left....	cent...	fin-cast....	sing..	Eisemann..	hand....
G. M. C....31	3,000	1,900	144*	pr-steel..	rigid....	solid....	36x3½	36x5	wood-ov.	3	4-3½x5	22.50	block...	right...	cent...	fin-cast....	sing..	Eisemann..	hand....
G. M. C....41	4,000	2,375	158*	pr-steel..	rigid....	solid....	36x4	36x4d	wood-ov	3	4-4½x5½	27.20	block...	right...	cent...	fin-cast....	sing..	Eisemann..	hand....
G. M. C....71	7,000	3,300	163*	rolled-c..	rigid....	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Eisemann..	hand....
G. M. C....101	10,000	3,850	163*	rolled-c..	rigid....	solid....	36x6	40x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left..	cent...	fin-cast....	sing..	Eisemann..	hand....
Gramm-Bernstein....	2,000	1,650	124*	pr-steel..	semi-flx	solid....	34x3½	34x4	wood-sq.	3	4-3⅞x5½	22.50	block...	right...	thermo.	fin-cast....	sing..	Eisemann..	hand....
Gramm-Bernstein....	3,000	2,000	130*	pr-steel..	semi-flx	solid....	34x3½	36x4	wood-sq.	3	4-3⅞x5½	22.50	block...	right...	thermo.	fin-cast....	sing..	Eisemann..	hand....
Gramm-Bernstein....	4,000	2,300	146	pr-steel..	semi-flx	solid....	34x4	34x3½d	wood-sq.	3	4-3⅞x5½	22.50	block...	right...	thermo.	fin-cast....	sing..	Eisemann..	hand....
Gramm-Bernstein....	5,000	2,700	156	pr-steel..	semi-flx	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast....	dual..	Eisemann..	hand....
Gramm-Bernstein....	7,000	3,400	158*	pr-steel..	semi-flx	solid....	36x5	40x5d	cast-hol.	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast....	dual..	Eisemann..	hand....
Gramm-Bernstein....	10,000	4,300	168*	pr-steel..	semi-flx	solid....	36x6	40x6d	cast-hol.	3	4-4½x6½	32.40	pairs....	left....	cent...	fin-cast....	dual..	Eisemann..	hand....
Gramm-Bernstein....	12,000	4,500	168*	pr-steel..	semi-flx..	solid....	36x6	40x7d	cast-hol..	3	4-4½x6½	32.40	pairs....	left....	cent...	fin-cast....	dual..	Eisemann..	hand....
Hahn....C	2,000	1,750	136*	pr-steel..	.....	solid....	36x3½	36x5	wood-ov.	3	4-4½x5½	2 .20	block...	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Hahn....E	4,000	2,250	144*	pr-steel..	.....	solid....	36x4	36x4d	wood-ov.	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Hall....	4,000	2,000	132	rolled-c..	semi-flx..	solid....	36x4	36x4d	wood-sq*	3	4-4½x5½	27.20	block...	left....	cent...	fin-cast....	sing..	Bosch*....	fixed....
Hall....	7,500	2,800	144	rolled-c..	semi-flx..	solid....	36x5	36x5d	wood-sq*	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Bosch*....	fixed....
Hall....	10,000	3,400	144	rolled-c..	semi-flx..	solid....	36x5	40x6d	wood-sq*	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Bosch*....	fixed....
Harrison....C	7,000	.....	.....	rolled-c..	rigid....	solid....	37x5	37x4½d	wood-ov.	3	4-4½x5	32.40	pairs....	right....	cent...	....sheet..	dual..	Bosch....	hand....
Harrison....F	7,000	.....	.....	rolled-c..	rigid....	solid....	37x5	37x5d	wood-sq.	3	4-4½x5	32.40	pairs....	right....	cent...	sq-t-sheet..	dual..	Bosch	hand....
Harvey....W-F	4,000	2,250	150	rolled-c..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	auto....
Harvey....W-H	7,000	2,950	160*	rolled-c..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x6	29.00	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	auto....
Harvey....W-K	10,000	3,600	160*	rolled-c..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4-4½x6	32.40	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	auto....
Hawkeye....H	2,500	1,300	136*	rolled-c..	.....	solid....	34x3½	34x5	wood-sq.	3	4-3⅞x5	22.50	block...	head...	gear...	fin-cast....	sing..	Eisemann..	hand....
Horner....	3,000	2,250	145	pr-steel..	rigid....	solid....	36x4	36x4	wood-sq.	3	4-4½x5½	27.20	block...	.....	cent...	fin-cast....	dual..	.....	hand....
Horner....	4,000	2,650	145	pr-steel..	rigid....	solid....	36x4	36x3½d	wood-sq.	3	4-4½x5½	27.20	block...	.....	cent...	fin-cast....	dual..	.....	hand....

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s. *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular;* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR											TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM				GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds					Hand	Foot	Steer	Levers	
.....	.....	.....	cent..	motor..	Pierce...	1,500	14	Stmbg..	grav.	seat..	wet-d.	ind-c.	amid...	3	8.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Corbitt.....A
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	dash.	dry-d..	selec.	unit-m.	3	4.50–1	bevel..	tor-t...	tor-t...	int-r-w.	int-r-w.	left..	cent..	Corliss.....A
.....	.....	.....	.....	.....	none....	1,000	17½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	5.00–1	bevel..	springs.	springs.	int.....	ext-r-w.	left..	cent..	Croce.....17
s, l & i...	Splitdf..	stock...	.....	.....	none....	2,500	40	Scheb..	grav.	dash.	.....	roller	unit-x.	.....	.....	roller..	sub-f...	sub-f...	ext-r-w.	.....	left..	c & l..	Crowther–Duryea.....
none...	.....	.....	.....	.....	none....	.....	.....	.....	vac..	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Dart.....B–B
.....	.....	.....	.....	.....	none....	.....	.....	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Dart.....E
none...	.....	.....	cent..	duplex..	Duplex*.	.....	.....	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	4	9.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Dart.....C–C
s & l....	Al-Chal..	85.00	.....	.....	.....	.....	.....	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	3	6.20–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	D–E.....Junior
.....	.....	.....	suct..	motor..	Mon'rch.	1,250	16	Zenith..	vac..	seat..	dry-d..	selec.	unit-m.	3	7.80–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	D–E.....Senior
none...	.....	.....	cent..	motor..	Pierce...	1,800	15	Master.	grav.	seat..	cone..	selec.	unit-m.	3	6.83–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	DeKalb.....D–1½
none...	.....	.....	cent..	motor..	Pierce...	1,800	13	Master.	grav.	seat..	dry-d..	selec.	unit-m.	3	8.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	DeKalb.....D–2½
s & l....	Al-Chal..	85.00	cent..	motor..	Milwk...	1,800*	22*	Zenith..	grav.	dash.	dry-d..	selec.	unit-m.	3	8.20–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Denby.....R
s & l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,440	17	Stmbg..	grav.	dash.	dry-d..	selec.	unit-m.	3	8.80–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Denby.....G
s & l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,320	15	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	9.45–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Denby.....H
s & l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,240	14	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	9.45–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	c & l..	Denby.....K
s & l....	U.S.L...	stock...	.....	.....	.....	2,000	25	Ray...	vac..	rear..	none..	fric..	amid...	4	9.00–1	dbl chn.	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent..	Dispatch.....G
.....	.....	.....	.....	.....	Wauk'a..	1,000	14	Holley..	grav.	.....	dry-d..	selec.	unit-m.	3	8.00–1	dbl chn.	rad-rd..	.....	int.....	ext....	right.	cent..	Doane.....
.....	.....	.....	cent..	motor..	Wauk'a..	1,000	10	Holley..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.50–1	dbl chn.	rad-rd..	.....	int.....	ext....	right.	cent..	Doane.....
lighting.	Westghs.	stock...	.....	.....	.....	.....	.....	Stmbg..	vac..	.....	dry-d..	prog.	unit-m.	3	4.08–1	sp-bev..	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Dorris.....I–B–4
.....	.....	.....	cent..	motor..	Pierce...	1,085	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent.	Dorris.....I–B–W
s, l & i...	Apple...	stock...	.....	.....	.....	.....	.....	Carter..	grav.	seat..	cone..	selec.	unit-m.	3	4.46–1	bevel..	springs.	tor-t...	int-r-w.	int-r-w.	left..	cent..	Ellsworth.....25–A
s, l & i*..	.....	opt....	c't*..	motor*.	Simplex*	1,067*	18*	Zenith..	grav.	seat..	dry-p..	selec.	amid...	3	6.00–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left*	cent..	Federal.....S
s & l-2...	Westghs.	245.00	cent..	motor..	own.....	1,190	15	Stmbg..	grav.	seat..	cone..	selec.	amid...	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Federal.....J–M
s & l-2...	Westghs.	150.00	cent..	motor..	own.....	1,031	13	Stmbg..	grav.	seat..	cone..	selec.	amid...	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Federal.....O–P
lighting.	Westghs.	150.00	cent..	motor..	own.....	1,160	12	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent..	Federal.....L
s, l & i*..	.....	opt....	cent..	motor..	Simplex	1,000	10	Zenith..	grav.	seat..	dry-p..	selec.	amid...	4	11.60–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left*	cent..	Federal.....W
.....	.....	.....	suct..	motor..	Mon'rch.	1,200	16	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Forschler.....
.....	.....	.....	cent..	motor..	Pierce...	1,200	12	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Forschler.....
s & l....	N-East..	300.00	cent..	motor..	Pierce...	1,100	14	Stmbg..	grav.	seat..	wet-d.	ind-c.	amid...	3	8.90–1	bevel-4.	springs.	t-arm..	ext-r-w.	ext-sht.	right.	right.	F. W. D.....B
s & l....	Westghs.	175.00	suct..	motor..	Mon'rch.	1,238	17	Ray...	grav.	seat..	dry-d..	selec.	unit-m.	3	7.80–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Garford.....75
s & l....	Westghs.	175.00	suct..	motor..	Mon rch.	1,111	14	Ray...	grav.	seat..	dry-d..	selec.	amid...	3	8.50–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Garford.....66
s & l....	Westghs.	175.00	suct..	motor..	Mon'rch.	934	13	Ray....	grav.	seat..	dry-d..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Garford.....70
s & l....	Westghs.	175.00	cent..	motor..	own.....	1,041	12	Ray...	grav.	seat..	dry-d..	selec.	amid...	4	10.33–1	worm..	rad-rd..	springs.	ext-sht.	int-r-w.	right.	cent..	Garford.....77–B
none...	.....	.....	suct..	motor..	own.....	1,005.	9	Ray...	grav.	seat..	dry-d..	selec.	unit-j.	4	13.31–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	right.	right.	Garford.....68
none...	.....	.....	suct..	motor..	own.....	..920	8	Ray....	grav.	seat..	dry-d..	selec.	unit-j.	4	13.31–1	dbl chn.	rad-rd..	.....	int-r-w.	int-sht..	right.	right.	Garford.....69
.....	.....	.....	cent..	motor..	own.....	900	16	Scheb..	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	900	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	900	12	Scheb..	grav.	seat..	cone..	selec.	amid...	3	9.67–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	850	10	own....	pres..	seat..	cone..	selec.	amid...	4	9.36–1	int-g...	rad-rd..	t-arm..	ext-r-w.	ext-sht.	right.	right.	G. V.–Mercedes....F.V.
s & l-2...	Westghs.	stock...	suct..	motor..	Mon'rch.	1,050	13	Ray...	vac..	seat..	dry-p..	ind-c.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gersix.....C
.....	.....	.....	cent..	d-shft..	Pierce...	3,400	25	Master.	vac..	seat..	dry-d..	selec.	unit-m.	3	7.40–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent.	Globe.....
none...	.....	.....	suct..	motor..	Mon'rch.	1,150	20	Marvel.	grav.	seat..	cone..	selec.	amid...	3	6.00–1	bevel..	tor-t...	tor-t...	int-r-w.	ext-r-w.	left..	cent..	G. M. C.....15
none...	.....	.....	suct..	motor..	Mon'rch.	1,380	18	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....21
none...	.....	.....	suct..	motor..	Mon'rch.	1,150	15	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	4	9.25–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....31
none...	.....	.....	suct..	motor..	Mon'rch.	1,200	14	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	4	9.25–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....41
none...	.....	.....	suct..	motor..	Mon'rch.	1,250	12	Marvel.	grav.	seat..	dry-d..	selec.	amid...	4	12.00–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....71
none...	.....	.....	suct..	motor..	Mon'rch.	1,250	10	Marvel.	grav.	seat..	dry-d..	selec.	amid...	4	13.67–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....101
s & l-2*..	Westghs.	200.00*	l-b...	motor..	Wauk'a..	1,200	19	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
s & l-2*..	Westghs.	200.00*	l-b...	motor..	Wauk'a..	1,200	17	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gramm–Bernstein.....
s & l-2*..	Westghs.	200.00*	l-b...	motor..	Wauk'a..	1,200	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	8.60–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gramm–Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gramm–Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	4	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	10	Zenith..	grav.	seat..	cone..	ind-c.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	10	Zenith..	grav.	seat..	cone..	ind-c.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
.....	.....	.....	cent..	motor..	Pierce...	1,175	18	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	.....	cent..	Hahn.....C
.....	.....	.....	cent..	motor..	Pierce...	980	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	rad-rd..	t-arm..	.....	.....	left..	cent..	Hahn.....E
lighting.	Bosch...	50.00	suct..	motor..	Mon'rch.	1,250	20	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Hall.....
lighting.	Bosch...	50.00	suct*	motor..	Mon*...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.51–1	worm*	sp'gs*..	sp'gs*..	int-r-w.	int-r-w.	left..	cent..	Hall.....
lighting.	Bosch...	50.00	suct*	motor..	Mon*...	1,200	12	Zenith..	grav.	.....	dry-d..	selec.	unit-m.	4	12.00–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j. s.	left..	cent..	Hall.....
.....	.....	.....	cent..	motor..	own.....	1,025	12	Scheb..	grav.	seat..	cone..	selec.	unit-j..	3	9.43–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-r-w.	right.	right.	Harrison.....C
.....	.....	.....	cent..	motor..	own.....	1,000	12	Stmbg..	grav.	seat..	cone..	selec.	unit-j..	3	9.60–1	dbl chn.	rad-rd..	.....	int.....	ext....	right.	cent..	Harrison.....F
s & l-2...	Westghs.	125.00	cent..	duplex..	Duplex..	1,000	14	Holley..	grav.	seat..	dry-p..	selec.	amid...	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Harvey.....W–F
s & l-2...	Westghs.	150.00	cent..	duplex..	Duplex..	1,000	13	Stmbg..	grav.	seat..	dry-p..	selec.	amid...	4	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Harvey.....W–H
s & l-2...	Westghs.	150.00	cent..	duplex..	Duplex..	900	11	Stmbg..	grav.	seat..	dry-p..	selec.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Harvey.....W–K
.....	.....	.....	.....	.....	.....	1,700	.....	Master.	vac..	.....	dry-p..	selec.	unit-m.	3	.....	int-g..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Hawkeye.....H
.....	.....	.....	cent..	motor..	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	.....	3	.....	worm..	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Horner.....
.....	.....	.....	cent..	motor..	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	.....	.....	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Horner.....

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; sp'gs, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR							IGNITION		
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		Type	Make	Spark Advance
							Front	Rear							Water Circulation	Radiator Core and Case			
Horner	6,000	$3,200	145	rolled-c.	rigid	solid	36x5	40x4d	wood-sq.	3	4-4½x5½	32.40	pairs	opp.	cent.	fin-cast.	dual		hand
Horner	10,000	4,200	156	rolled-c.	rigid	soid	38x6	42x6d	wood-sq.	3	4-5¼x5½	44.20	pairs	opp.	cent.	fin-cast.	dual		hand
Hurlburt	3,000	2,250	136*	pr-steel.	rigid	solid	34x4	34x5	wood-ov.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann.	fixed
Hurlburt	4,000	3,000	148*	pr-steel.	rigid	solid	36x4	36x4d	wood-ov.	3	4-4¼x5½	27.20	block	right	cent.	fin-cast	dual	Eisemann.	fixed
Hurlburt	7,000	3,500	146*	pr-steel.	rigid	solid	36x5	36x5d	wood-ov.	3	4-4½x5½	29.00	block	right	cent.	fin-cast	dual	Eisemann.	fixed
Hurlburt	10,000	4,250	156*	pr-steel.		solid	36x5	38x6d	wood-ov.	4	6-3¾x5½	33.75	block	right	cent.	fin-cast	dual	Eisemann.	fixed
Hurlburt	14,000	5,000	156*	pr-steel.		solid	36x6	40x7d	wood-ov.	4	6-3¾x5½	33.75	block	right	cent.	fin-cast	dual	Eisemann.	fixed
Independent F	2,000	1,385	128*	pr-steel.		solid*	36x3*	36x4*	wood-sq.	3	4-3¼x5	19.61	block		cent.	z-z-t-sheet	sing.	Eisemann.	fixed
Independent G	4,000	1,850	144	pr-steel.		solid	36x3½	36x5	wood-sq.	3	4-4¼x5½	27.20	block		cent.	z-z-t-cast	sing.	Eisemann.	fixed
I.H.C. H	1,500	1,225	115	pr-steel.	semi-flx.	solid	36x3	36x3½	wood-ov.	3	4-3½x5½	19.61	block	right	cent.	fin-sheet	sing.	Bosch	hand
I.H.C. F	2,000	1,500	128*	pr-steel.	semi-flx.	solid	36x3½	36x4	wood-ov.	3	4-3½x5¾	19.61	block	right	cent.	fin-sheet	sing.	Bosch	hand
Jeffery 1016	1,500	965	116	pr-steel.	flexible	pneu	35x4½	35x4½	wood-ov.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Dixie	hand
Jeffery 2016	3,000	1,465	130	pr-steel.	flexible	p & s	34x4½	34x5	w'd-sq*	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Dixie	hand
Jeffery Quad 4016	4,000	2,850	124*	pr-steel.	flexible	solid	36x5	36x5	cast-d	3	4-4¼x5½	29.00	block	right	cent.	cell-sheet	sing.	Dixie	hand
Kelly-Springfield K-31	3,000	2,000	144*	pr-steel.	semi-flx.	solid*	36x3½*	36x6*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann.	auto
Kelly-Springfield K-32	3,000	2,000	144*	pr-steel.	semi-flx.	solid*	36x3½*	36x6*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann.	auto
Kelly-Springfield K-36	5,000	2,750	144*	pr-steel.	semi-flx.	solid*	36x4*	36x4d*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann.	auto
Kelly-Springfield K-35	5,000	2,750	144*	pr-steel.	semi-flx.	solid*	36x4*	36x4d*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann.	auto
Kelly-Springfield K-40	7,000	3,400	150*	pr-steel.	semi-flx.	solid*	38x5*	38x5d*	wood-sq.	3	4-4½x6½	32.40	pairs	opp.	cent.	cell-sheet	sing.	Eisemann.	auto
Kelly-Springfield K-45	8,000	3,600	150*	pr-steel.	semi-flx.	solid*	38x5*	40x6d*	wood-sq.	3	4-4½x6½	32.40	pairs	opp.	cent.	cell-sheet	sing.	Eisemann.	auto
Kelly-Springfield K-50	10,000	4,250	150*	pr-steel.	semi-flx.	solid*	38x6*	40x6d*	wood-sq.	3	4-4½x6½	32.40	pairs	opp.	cent.	cell-sheet	sing.	Eisemann.	auto
Kelly-Springfield K-60	12,000	4,500	150*	pr-steel.	semi-flx.	solid*	38x6*	40x7d*	w'd-sq*	3	4-4¾x6½	32.40	pairs	opp.	cent.	cell-sheet	sing.	Eisemann.	auto
King	7,000	2,600	120	rolled-c.	flexible	solid	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	z-z-t-sheet	dual-d	Bosch	2 pt-fix
Kisselkar	1,500	950	124	pr-steel.	rigid	pneu	32x4	32x4	wood-sq.	3	4-3⅞x5½	24.22	block	right	cent.	sq-t-sheet	sing.	Eisemann.	hand
Kisselkar	2,000	1,250	132	pr-steel.	rigid	solid*	34x3*	34x4*	wood-sq.	3	4-3¾x5½	24.22	block	right	cent.	sq-t-sheet	sing.	Eisemann.	hand
Kisselkar	4,000	1,875	144*	pr-steel.	rigid	solid	34x3½	36x6	wood-sq.	3	4-4¼x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann.	hand
Kisselkar	5,000	2,250	166	pr-steel.	rigid	solid	34x4	36x4d	wood-sq.	3	4-4¼x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann.	hand
Kisselkar	8,000	2,850	168	pr-steel.	rigid	solid	36x5	36x5d	wood-sq.	3	4-4¼x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann.	hand
Kisselkar	10,000	3,350	180	pr-steel.	rigid	solid	36x6	36x6d	wood-sq.	3	4-4¼x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann.	hand
Kleiber AA	1,750	1,600	130*	rolled-c.	semi-flx	solid*	34x3*	34x5*	wood-ov.	3	4-3¾x5	22.50	block	right	thermo.	z-z-t-sheet	dual	Bosch	hand
Kleiber A1	3,000	2,250	140*	rolled-c.	semi-flx.	solid	36x3½	36x5*	wood-ov.	3	4-4¼x5¼	27.20	block	left	cent.	z-z-t-sheet	dual	Bosch	hand
Kleiber A2	4,000	2,400	145*	rolled-c.	semi-flx.	solid	36x3½*	36x6*	wood-sq.		4-4¼x5¼	27.20	block	left	cent.	z-z-t-sheet	dual	Bosch	hand
Kleiber B	5,000	2,750	150*	rolled-c.	semi-flx.	solid	36x4	36x4d	wood-sq.	3	4-4¼x5¼	27.20	block	left	cent.	z-z-t-sheet	dual	Bosch	hand
Kleiber C	7,000	3,500	160*	rolled-c.	semi-flx.	solid	36x5	36x5d	wood-sq.	3	4-4¼x5½	32.40	pairs	left	cent.	z-z-t-sheet	dual	Bosch	hand
Kleiber D	10,000	4,500	170*	rolled-c.	semi-flx.	solid	36x6	40x6d	wood-sq.	3	4-5¼x5¾	44.20	pairs	opp.	cent.	z-z-t-sheet	dual	Bosch	hand
Knickerbocker A	7,000	3,500	128	rolled-c.	rigid	solid	35x5	35x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	sq-t-sheet	dual	Bosch	hand
Knickerbocker C	10,000	4,500	148*	rolled-c.	rigid	solid	36x6	36x6d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	sq-t-sheet	dual	Bosch	hand
Knox Tractor 35		4,500	108½	rolled-c.	rigid	solid	36x5	38x6d	cast-hol.	3	4-5x5½	40.00	pairs	head	cent.	cell-sheet	sing.	Eisemann.	hand
Knox Tractor 36	6,000	5,000	108½	rolled-c.	rigid	solid*	36x4	38x6d*	cast-hol.	3	4-5x5½	40.00	pairs	head	cent.	cell-sheet	sing.	Eisemann.	hand
Koehler K	2,000	895	129	rolled-c.	rigid	solid	34x3	34x3½	wood-sq.	3	4-3½x5	19.61	block	head	thermo.	fin-cast	sing.	Heinze	fixed
Krebs 40	3,000	2,050	146	pr-steel.		solid	36x3½	36x5	wood-sq.	3	4-3¾x5½	22.50	block	left	cent.	tube-cast	sing.	Bosch	hand
Krebs 60	4,000	2,375	162	pr-steel.	semi-flx.	solid	36x4	36x4d*	wood-sq.	3	4-4¼x5½	27.20	block	left	cent.	tube-cast	sing.	Bosch	hand
Krebs 90	7,000	3,250	180	pr-steel.	semi-flx.	solid	36x5	36x5d	wood-sq.	3	4-4¼x5½	32.40	pairs	left	cent.	tube-cast	sing.	Bosch	hand
Lambert V2	2,000	1,700	144	rolled-c.	semi-flx.	solid	36x3½	36x4	wood-sq.	5	4-4¼x5¼	29.00	sing.	left	cent.	fin-sheet	sing*	Remy*	hand
Lane A	1,500	1,075	120	rolled-c.		solid*	34x3*	34x4*	wood-sq.	2	4-3¼x5	16.92	block	left	thermo.	fin-cast	sing.	G & D	hand
Lange C	3,000	1,850	130*	rolled-c.	rigid	solid	36x3½	38x4	wood-ov.	3	4-3¾x5½	22.50	block	right	thermo.	sq-t-sheet	sing.	Bosch	hand
Lange B	5,000	2,450	136*	rolled-c.	rigid	solid	36x4	38x6	wood-ov.	3	4-4¼x5½	27.20	block	right	thermo.	sq-t-sheet	sing.	Bosch	hand
Larrabee	2,000	1,550	130	pr-steel.	semi-flx.	solid*	34x3*	34x4*	wood-sq.	3	4-3¾x5	22.50	block	right	thermo.	sq-t-sheet	sing.	G & D*	hand
Larrabee	3,000	2,000	140*	pr-steel.	flexible	solid	36x3½	36x5	wood-sq.	3	4-4¼x5½	27.20	block	right	cent.	sq-t-cast	sing.	G & D*	hand
Larrabee	5,000	2,300	152*	pr-steel.	flexible	solid	36x4	36x6	wood-sq.	3	4-4¼x5½	27.20	block	right	cent.	sq-t-cast	sing.	G & D*	hand
Lawson 35	1,000		112	pr-steel.		pneu	31x4	31x4	wood-ov.	3	4-3¾x4¼	22.50	block	right	thermo.	cell-sheet	sing.	Dixie	hand
Lincoln L	2,000	975	122*	pr-steel.	semi-flx.	pneu	33x5	33x5	wood-ov.	3	4-3½x5	19.61	block	right	thermo.	tube-cast	sing.	Dixie	fixed
Lippard-Stewart MW	1,000	1,000	106	pr-steel.	semi-flx.	pneu	33x4	33x4	wood-ov.	2	4-3¼x5	16.92	block	left	thermo.	sq-t-sheet	sing.	Berling	fixed
Lippard-Stewart W	1,500	1,600	125*	pr-steel.	semi-flx.	pneu	35x4½	35x4½	wood-ov.	3	4-3¾x5½	22.50	block	left	cent.	sq-t-sheet	sing.	Eisemann.	fixed
Lippard-Stewart H	2,000	2,000	145	pr-steel.	semi-flx.	solid	36x3	36x5	wood-ov.	3	4-3¾x5½	22.50	block	left	cent.	sq-t-cast	sing.	Eisemann.	fixed
Lippard-Stewart F	3,000	2,300	145*	pr-steel.	flexible	solid	36x3½	36x3d	wood-ov.	3	4-4¼x5½	27.20	block	left	cent.	sq-t-cast	sing.	Eisemann.	fixed
Lippard-Stewart G	4,000	2,600	158*	pr-steel.	flexible	solid	36x4	36x4d	wood-ov.	3	4-4¼x5¾	27.20	block	left	cent.	sq-t-cast	sing.	Eisemann.	fixed
Little Giant 15	1,500	1,500	138	pr-steel.	semi-flx.	p. & s	34x4	34x3½	wood-sq.	3	4-3½x5	19.61	block	right	thermo.	cell-sheet	sing.	Eisemann.	hand
Little Giant H	2,000	1,400	110	rolled-I	semi-flx.	solid	36x3	36x3½	wood-sq.	3	4-3½x5½	19.61	block	right	thermo.	z-z-t-sheet	sing.	Eisemann.	hand
Little Giant H	3,000	1,500	110	rolled-c.	semi-flx.	solid	36x3½	36x4	wood-sq.	3	4-3½x5½	19.61	block	right	thermo.	z-z-t-sheet	sing.	Eisemann.	hand
Little Giant 16	4,000	2,500	144	pr-steel.	semi-flx.	solid	36x4	36x6	wood-sq.	3	4-4¼x5¼	27.20	block	left	cent.	cell-sheet	sing.	Eisemann.	hand
Maccar L	3,000	2,100	150	pr-steel.	rigid	solid	36x4	36x5	wood-sq.	3	4-4¼x5¼	27.20	block	left	cent.	fin-sheet	sing.	Bosch	hand
Maccar H	5,000	2,600	162	pr-steel.	rigid	solid	36x4	36x4d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	cell-sheet	sing.	Bosch	hand
Maccar M	7,000	3,250	174	pr-steel.	rigid	solid	37x5	37x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	cell-sheet	sing.	Bosch	hand
Maccar U	11,000		186	pr-steel.	rigid	solid	37x5	40x6d	wood-sq.		4-4½x5½	32.40	pairs	left	cent.	cell-sheet	sing.	Bosch	hand
Mack AB	2,000	2,000	144*	pr-steel.	semi-flx.	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	2,000	2,000	144*	pr-steel.	semi-flx.	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	3,000	2,350	162*	pr-steel.	semi-flx.	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	3,000	2,350	162*	pr-steel.	semi-flx.	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	4,000	2,700	162*	pr-steel.	semi-flx.	solid	36x4	36x4d	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	4,000	2,700	162*	pr-steel.	semi-flx.	solid	36x4	36x4d	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AC	7,000	3,400	156*	pr-steel.	semi-flx.	solid	36x5	40x5d	wood-sq.	3	4-5x6	40.00	pairs	right	cent.	ring-cast	dual	Bosch	hand

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price, -c,** *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s. *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single:* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION								BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET											
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	Name and Model
.....	.....	.....	cent..	motor..	.....	.....	.....	.....	grav.	.....	dry-d..	selec.	.....	3	9.40–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Horner
.....	.....	.....	cent.	motor..	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	amid...	3	13.42–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Horner
lighting.	Vesta...	stock...	cent..	motor..	Pierce...	1,200	18	Flech..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Hurlburt
lighting.	Vesta...	stock...	cent..	motor..	Pierce...	1,200	16	Flech..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm.	int-r-w.	ext-r-w.	left..	cent..	Hurlburt
lighting.	Vesta...	stock...	cent..	motor..	Pierce...	1,200	13	Flech..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm.	int.....	ext.....	left..	cent..	Hurlburt
lighting.	Westghs.	stock...	cent..	motor..	Pierce...	1,200	12	Flech..	grav.	seat..	dry-d..	selec.	amid...	3	10.33–1	worm..	rad-rd..	t-arm.	int-r-w.	int-r-w.	left..	cent..	Hurlburt
lighting.	Westghs.	stock...	cent..	motor..	Pierce...	1,200	12	Flech..	grav.	seat..	dry-d..	selec.	amid...	4	11.33–1	worm..	rad-rd..	t-arm.	int-r-w.	ext-sht.	left..	cent..	Hurlburt
s, l&i...	Jesco....	100.00	suct..	motor..	Mon'rch.	1,350	.....	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Independent.....F
.....	.....	.....	suct..	motor..	Mon'rch.	.....	.....	Marvel.	grav.	seat..	dry-d.	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Independent.....G
s &l*...	N-East*.	125.00	cent..	motor..	own.....	1,275*	18*	Holley..	grav.	seat..	cone..	selec.	amid...	3	7.00–1	int-g...	springs.	springs.	int-r-w.	int-r-w.	left..	cent .	I.H.C.....H
s &l*...	N-East*.	125.00	cent..	motor..	own.....	1,300	17	Holley..	grav.	seat..	cone..	selec.	amid...	3	8.00–1	int-g...	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	I.H.C.....F
s &l-2...	Bijur....	stock...	.....	.....	.....	1,750	40	Stmbg..	.....	.....	dry-p..	selec.	unit-m.	3	4.50–1	sp-bev..	springs.	springs.	ext-sht.	ext-r-w.	left..	cent..	Jeffery.....1016
s &l-2...	Bijur....	stock...	cent..	duplex..	Duplex..	1,500	16	Stmbg..	grav.	dash.	dry-p..	selec.	unit-m.	3	8.10–1	int-g...	springs.	springs.	ext-sht..	ext-r-w.	left..	cent.	Jeffery.....2016
s &l-2...	Bijur....	125.00	cent..	duplex..	Duplex..	1,500	14	Stmbg..	grav.	seat..	dry-p..	ind-c.	amid...	4	8.50–1	int-g-4.	springs.	springs.	ext-sht.	int-4-w.	left..	cent.	Jeffery Quad.....4016
s &l-2...	R & M*.	175.00	l-b...	motor..	own.....	1,200	15	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield...K–31
s &l-2...	R & M*.	175.00	l-b...	motor..	own.....	1,200	15	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield...K–32
s &l-2...	R & M*.	175.00	l-b...	motor..	own.....	1,200	11	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield...K–36
s &l-2...	R & M*.	175.00	l-b...	motor..	own.....	1,200	11½	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield...K–35
s &l-2...	R & M*.	175.00	l-b...	motor..	own.....	1,100	12	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield...K–40
s &l-2...	R & M*.	175.00	l-b...	motor..	own.....	1,100	12	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield...K–45
s &l-2...	R & M*.	175.00	l-b...	motor..	own.....	1,100	10¾	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent.	Kelly–Springfield...K–50
s &l-2...	R & M*.	175.00	l-b....	motor..	own.....	1,100	10½	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	.....	.....	left..	cent..	Kelly–Springfield...K–60
.....	.....	.....	cent..	motor..	Pierce...	1,000	12	Scheb..	grav.	seat..	dry-d..	ind-c.	unit-j..	3	8.67–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j...	right.	right.	King
s &l-2*..	Remy...	150.00*	cent..	motor..	Pierce...	1,200	25	Stmbg..	vac..	seat..	cone..	selec.	unit-m.	3	4.58–1	sp-bev..	springs.	springs.	ext-r-w.	ext-r-w.	left..	cent..	Kisselkar
s &l-2*..	Remy...	150.00	cent..	motor..	Pierce...	1,280	20	Stmbg..	vac..	seat..	cone..	selec.	unit-m.	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar
s &l-2*..	Remy...	150.00	cent..	motor..	Pierce...	1,295	15	Stmbg..	vac..	seat..	dry-p..	selec.	unit-m.	4	9.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar
s &l-2*..	Remy...	150.00	cent.	motor..	Pierce...	1,060	13	Stmbg..	vac..	seat..	dry-p..	selec.	unit-m.	4	8.70–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar
s &l-2*..	Remy...	150.00	cent..	motor..	Pierce...	1,425	13	Stmbg..	vac..	seat..	dry-p..	selec.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar
.....	.....	.....	cent .	motor..	Pierce...	1,456	12	Stmbg..	vac..	seat..	dry-p.	selec.	amid...	4	13.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar
lighting.	.....	opt....	cent..	motor..	Pierce...	1,300	20	Scheb..	grav.	seat..	dry-p.	selec.	unit-m.	3	6.75–1	worm..	springs.	springs.	int	int.....	right.	cent .	Kleiber.....AA
lighting.	.....	opt....	cent..	motor..	Pierce...	1,250	18	Scheb..	grav.	seat..	wet-d.	selec.	amid...	3	6.50–1	worm..	springs.	springs.	int	ext....	right.	cent..	Kleiber.....A1
lighting.	.....	opt....	cent..	motor..	Pierce...	1,225	17	Scheb..	grav.	seat..	wet-d.	selec.	amid...	3	7.75–1	worm..	rad-rd .	springs.	int	ext....	right.	cent..	Kleiber.....A2
lighting.	.....	opt....	cent..	motor..	Pierce...	1,200	16	Scheb..	grav.	.....	wet-d.	selec.	amid...	3	8.67–1	worm..	springs.	springs.	int	ext....	right.	cent..	Kleiber.....B
lighting.	.....	opt....	cent..	motor..	Pierce...	1,150	14	Scheb..	grav.	seat..	wet-d.	selec.	amid...	3	8.75–1	worm..	springs.	springs.	int	int.....	right.	cent..	Kleiber.....C
lighting.	.....	opt....	cent..	motor..	Pierce...	1,100	12	Scheb..	grav.	seat..	wet-d.	selec	amid...	4	8.75–1	worm..	springs.	springs.	int	int.....	right.	cent..	Kleiber.....D
lighting.	.....	stock...	cent..	motor..	Pierce...	1,500	12	Stmbg..	grav.	seat..	cone..	selec.	unit-m.	3	3.50–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-f-w.	left..	left..	Knickerbocker.....A
lighting.	.....	stock...	cent..	motor..	Pierce...	1,500	10	Stmbg..	grav.	seat..	cone..	selec.	unit-m.	3	3.50–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-f-w.	left..	left..	Knickerbocker.....C
s &l-2...	Bijur....	stock...	.....	.....	none.....	.....	.....	Zenith..	vac..	r-bd..	dry-p..	selec.	unit-j..	3	9.60–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s..	left..	cent..	Knox Tractor.....35
s &l-2...	Bijur....	stock...	.....	.....	none.....	.....	.....	Zenith.	vac.	r-bd..	dry-p..	selec.	unit-j..	3	12.05–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Knox Tractor.....36
none....	.....	.....	opt..	opt....	opt.....	2,050	30	Zephyr.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Koehler.....K
.....	.....	.....	cent.	motor..	own.....	1,100	15	Zenith..	grav	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Krebs.....40
.....	.....	.....	cent..	motor..	own.....	1,110	14	Zenith..	grav.	seat..	dry-d..	selec.	amid...	4	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Krebs.....60
.....	.....	.....	cent..	motor..	own.....	1,160	12	Zenith..	grav.	seat..	dry-d..	selec.	amid...	4	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	right.	Krebs.....90
s, l&i...	.....	100.00	cent..	motor..	Pierce...	1,500	.....	Scheb..	grav.	seat..	none..	fric..	amid...	inf...	.....	dbl chn.	rad-rd..	.....	int.....	ext....	left*.	.....	Lambert.....V2
.....	G & D...	stock...	.....	.....	.....	.....	.....	Shkspr.	grav.	dash.	wet-d.	selec.	unit-m.	3	6.20–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Lane.....A
none....	.....	.....	cent..	motor..	Pierce...	1,250	18	Stmbg..	grav.	seat..	wet-d.	ind-c.	unit-j..	3	8.05–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Lange.....C
none....	.....	.....	cent..	motor..	Pierce...	1,250	15	Stmbg..	grav.	seat..	wet-d.	ind-c.	unit-j..	3	9.21–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Lange.....B
s, l&i...	G & D...	stock...	cent..	motor..	Pierce...	1,200	18¾	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Larrabee
s, l &i-2.	G & D...	stock...	cent..	motor..	Pierce...	1,200	15	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Larrabee
s, l &i-2.	G & D...	stock...	cent..	motor..	Pierce...	1,200	14	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Larrabee
s &l-2	Splitdf..	opt....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	wet-p.	selec.	unit-m.	3	4.30–1	bevel...	springs.	tor-t...	int.....	ext....	left..	cent..	Lawson.....35
s, l &i...	Delco...	100.00	suct..	motor..	Mon'rch.	1,500	20	Zenith..	vac..	.....	cone..	selec.	unit-m.	3	6.50–1	bevel...	.....	t-arm.	int-r-w.	ext-r-w.	left..	c & l..	Lincoln.....L
s &l-2	Remy...	stock...	.....	.....	none....	1,525	25	Zenith..	grav.	seat..	cone..	selec.	amid...	3	5.80–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Lippard–Stewart....MW
s &l....	Dyneto..	135.00	.....	.....	none....	1,182	20	Zen*...	grav	.....	cone..	selec.	amid...	3	6.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left.	cent..	Lippard–Stewart.....W
s &l....	Dyneto..	135.00	cent..	motor..	Pierce...	1,134	18	Zenith..	grav.	seat..	cone..	selec.	amid...	3	6.75–1	worm..	springs.	springs.	int.....	ext.....	left.	cent..	Lippard–Stewart.....H
s &l....	Dyneto..	135.00	cent..	motor..	Pierce...	1,300	18	Zen*...	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left.	cent..	Lippard–Stewart.....F
s &l....	Dyneto..	135.00	cent..	motor..	Pierce...	1,295	15	Zen*...	grav.	seat..	cone..	selec.	amid...	3	9.25–1	worm..	springs.	springs.	int.....	int.....	left.	cent..	Lippard–Stewart.....G
lighting.	.....	stock...	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Little Giant.....15
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	.....	wet-d.	.....	unit-j..	3	6.88–1	dbl chn.	rad-rd..	.....	ext.....	ext.....	right.	cent..	Little Giant.....H
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	wet-d.	selec.	unit-j..	3	6.88–1	dbl chn.	rad-rd..	.....	ext-r-w.	ext-j-s..	right.	cent..	Little Giant.....H
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Little Giant.....16
none....	.....	.....	cent..	motor..	Pierce...	1,000	16	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.75–1	worm..	rad-rd..	springs.	ext-r-w.	. r-w..	left..	cent..	Maccar.....L
none....	.....	.....	cent..	motor..	Pierce...	1,000	13¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Maccar.....H
none....	.....	.....	cent..	motor..	Pierce...	1,000	10¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.20–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Maccar.....M
none....	.....	.....	cent..	motor..	Pierce...	1,000	8¾	Stmbg..	grav.	seat..	dry-d..	selec.	amid...	4	13.66–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Maccar.....U
s &l-2...	Bosch...	250.00	cent..	motor..	own.....	1,160	19¾	Stmbg..	grav.	seat..	dry-d	selec.	unit-m.	3	6.29–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s &l-2...	Bosch...	250.00	cent..	motor..	own.....	1,160	17¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1*	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s &l-2...	Bosch...	250.00	cent..	motor..	own.....	1,160	16	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1*	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s &l-2...	Bosch...	250.00	cent..	motor..	own.....	1,160	17¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.99–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s &l-2...	Bosch...	250.00	cent..	motor..	own.....	1,160	16	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1*	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s &l-2...	Bosch...	250.00	cent..	motor..	own.....	1,160	17¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.99–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s &l-2...	Bosch...	250.00	cent..	motor..	own.....	1,000	15¾	Stmbg..	grav.	seat.	dry-p..	selec.	unit-j.	3	7.54–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack.....AC

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic.* **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; sp'gs, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*.* **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR									
				Material	Construction	Kind	SIZES IN INCHES Front	SIZES IN INCHES Rear		No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING Water Circulation	COOLING Radiator Core and Case	IGNITION Type	IGNITION Make	IGNITION Spark Advance
Mack.....AC	11,000	$4,000	156*	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4-5x6	40.00	pairs....	right...	cent...	ring-cast...	dual..	Bosch.....	hand....
Mack.....AC	15,000	4,500	156*	pr-steel..	semi-flx..	solid....	36x7	40x7d	wood-sq.	3	4-5x6	40.00	pairs....	right...	cent...	ring-cast...	dual..	Bosch.....	hand....
Mack Tractor.....AC	14,000	3,400	119	pr-steel..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4-5x6	40.00	pairs....	right...	cent...	ring-cast...	dual..	Bosch.....	hand....
Mack Tractor.....AC	22,000	4,000	119	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4-5x6	40.00	pairs....	right...	cent...	ring-cast...	dual..	Bosch.....	hand....
Mack Tractor.....AC	30,000	4,500	119	pr-steel..	semi-flx..	solid....	36x7	40x7d.	wood-sq.	3	4-5x6	40.00	pairs....	right...	cent...	ring-cast...	dual..	Bosch.....	hand....
Maxwell.....25	500	535	103	pr-steel..	flexible..	pneu....	30x3½	30x3½	wood-ov.	2	4-3⅜x4½	21.08	block...	right...	thermo.	fin-sheet...	dual..	Simms....	hand....
Menominee.....EW	1,500	1,295	124	rolled-c..	semi-flx..	cush....	36x4	37x5½	wood-ov.	3	4-3½x5	22.50	block...	right...	thermo.	cell-sheet..	sing...	Bosch.....	hand....
Menominee.....FW	2,000	1,575	130*	rolled-c..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	cell-sheet..	sing...	Bosch.....	hand....
Menominee.....H	3,000	1,775	130*	rolled-c..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	cell-sheet..	sing...	Bosch.....	hand....
Menominee.....D	4,000	2,240	144*	rolled-c..	semi-flx..	solid....	36x4	36x6*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing...	Bosch.....	hand....
Menominee.....G	7,000	2,775	160*	rolled-c..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Bosch.....	hand....
Mercury Bulley Trac..A	.....	3,400	71	rolled-c..	rigid....	solid....	34x4	38x4d	wood-sq.	3	4-4½x5	29.00	pairs....	opp....	cent...	cell-sheet..	dual..	Bosch.....	hand....
Moreland.....15-D	2,000	1,650	126	pr-steel..	semi-flx..	solid....	34x3½	34x4	wood-sq.	3	4-3⅜x5	22.50	block...	right...	thermo.	cell-cast...	sing...	Dixie.....	hand....
Moreland.....15-B	3,000	1,950	126*	pr-steel..	semi-flx..	solid....	34x3½	34x5	wood-sq.	3	4-4¼x5½	27.20	block...	right...	cent...	cell-sheet..	sing...	Dixie.....	hand....
Moreland.....15-C	5,000	2,550	144*	pr-steel..	semi-flx..	solid....	34x4	34x4d	wood-sq.	3	4-4½x5½	32.40	pairs....	right...	cent...	cell-sheet..	sing...	Dixie.....	hand....
Moreland.....15-G	8,000	3,400	162*	pr-steel..	semi-flx..	solid....	36x5	38x5d	wood-sq.	3	4-4½x6½	36.15	pairs....	right...	cent...	cell-sheet..	dual..	Dixie.....	hand....
Moreland.....16-J	10,000	3,800	180*	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4-4½x6½	36.15	pairs....	right...	cent...	cell-sheet..	dual..	Dixie.....	hand....
Moon.....B	3,000	1,600	140*	pr-steel..	rigid....	solid....	36x3½	36x4*	wood-ov.	3	4-3⅜x5½	22.50	block...	head...	gear...	z-z-t-sheet	dual..	Remy*....	.....
Nelson & LeMoon...E1	2,000	1,700	opt...	.....	.....	solid....	36x3	36x4	.....	3	4-3⅜x5½	22.50	block...	left....	cent...	sq-t-sheet..	sing...	Bosch.....	.....
Nelson & LeMoon...E2	4,000	2,250	opt...	.....	.....	solid....	36x4	36x7	.....	3	4-4¼x5½	27.20	block...	left....	cent...	sq-t-sheet..	dual..	Bosch.....	.....
Nelson & LeMoon...E3	6,000	2,950	opt...	.....	.....	solid....	36x5	38x5d	.....	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	auto....
Netco.....D	4,000	2,350	144*	pr-steel..	rigid....	solid....	36x4	36x6	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-t-cast..	sing...	Eisemann..	fixed....
Netco.....E	4,000	2,600	144*	pr-steel..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	6-3⅜x5½	33.75	threes...	right...	cent...	fin-t-cast..	dual..	G & D....	hand....
New York.....M	3,000	2,200	144*	rolled-c..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	sq-t-sheet..	sing...	Bosch.....	fixed....
Niles.....B	2,000	1,175	124	pr-steel..	flexible..	pneu....	35x5	35x5	wood-ov.	3	4-3½x5	19.61	block...	left....	thermo.	sq-t-sheet..	sing...	Eisemann..	hand....
Niles.....E	4,000	1,875	140*	pr-steel..	flexible..	solid....	36x4	36x7	wood-ov.	3	4-4¼x5¼	27.20	block...	left....	cent...	z-z-t-sheet	sing...	Eisemann..	hand....
Old Hickory.....	1,250	825	112	rolled-c..	semi-flx..	pneu....	33x4	33x4	wood-ov	.....	4-3½x5	16.92	block...	right...	thermo.	cell-sheet..	sing...	Conn.....	hand....
Old Reliable.....	3,000	1,950	150*	pr-steel..	semi-flx..	solid....	34x3	36x6	wood-sq.	3	4-3⅜x5	22.50	block...	left....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Old Reliable.....	4,000	2,450	150	rolled-c..	semi-flx..	solid....	34x4	36x4d	wood-sq.	4	4-4x6	25.60	block...	left....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Old Reliable.....	5,000	2,750	.....	rolled-c..	rigid....	solid....	34x4	36x4d	wood-sq.	3	4-4½x5	29.00	pairs....	opp....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Old Reliable.....	6,000	3,250	150	rolled-c..	semi-flx..	solid....	34x5	36x5d.	wood-sq.	4	4-4½x6	29.00	block...	left....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Old Reliable.....	8,000	3,750	.....	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4-4⅜x5½	36.15	pairs....	opp....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Old Reliable.....	8,000	3,750	.....	rolled-c..	.....	solid....	36x6	36x6d	wood-sq.	3	4-4⅜x5½	36.15	pairs....	opp....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Old Reliable.....	10,000	4,500	150*	rolled-c..	rigid....	solid....	36x6	36x6d	wood-sq.	3	4-4⅜x5½	36.15	pairs....	opp....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Old Reliable.....	14,000	5,000	150	rolled-c..	rigid....	solid....	36x6	40x7d	wood-sq.	3	4-5⅛x5¾	41.62	pairs....	opp....	cent...	sq-t-sheet..	sing...	Bosch.....	hand....
Overland.....75-B	800	625-c	104	pr-steel..	.....	pneu....	31x4	31x4	wood-ov.	2	4-3⅜x5	18.21	block...	right...	thermo.	cell-sheet..	.....	storage....	hand....
Overland.....	1,200	725	106	pr-steel..	.....	pneu....	33x4½	33x4½	wood-ov.	5	4-4¼x4½	27.20	block...	right...	thermo.	cell-sheet..	.....	Dixie.....	hand....
Packard.....1-D	2,000	2,200	126*	rolled-c..	.....	solid....	34x3½	34x6	wood-sq.	3	4-4x5½	25.60	block...	right...	cent...	cell-sheet..	dual..	Dixie.....	hand....
Packard.....1½-D	3,000	2,500	126*	rolled-c..	.....	solid....	34x3½	34x3½d	wood-sq.	3	4-4x5½	25.60	block...	right...	cent...	cell-sheet..	dual..	Dixie.....	hand....
Packard.....2-D	4,000	2,800	144*	rolled-c..	.....	solid....	34x4	34x4d	wood-sq.	3	4-4x5½	25.60	block...	right...	cent...	cell-sheet..	dual..	Dixie.....	hand....
Packard.....3-D	6,000	3,400	156*	rolled-c..	.....	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	block...	right...	cent...	cell-sheet..	dual..	Dixie.....	hand....
Packard.....4-D	8,000	3,800	156*	rolled-c..	.....	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	block...	right...	cent...	cell-sheet..	dual..	Dixie.....	hand....
Packet.....	600	350	100	pr-steel..	rigid....	pneu....	28x3	28x3	wood-ov.	2	4-2⅞x4	12.08	block...	right...	thermo.	fin-sheet...	sing...	At Kent...	auto....
Palmer.....	2,000	1,350	132½	pr-steel..	rigid....	solid....	34x3½	34x4	wood-sq.	3	4-3⅜x5	22.50	block...	right...	thermo.	sq-t-cast...	sing...	Bosch.....	fixed....
Palmer.....	4,000	1,975	144	pr-steel..	rigid....	solid....	36x3½	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	sq-t-cast...	sing...	Bosch.....	fixed....
Palmer-Moore.....K	1,500	1,150	106	pr-steel..	rigid....	solid....	36x3	36x3½	wood-ov.	3	4-3½x5½	19.61	block...	right...	thermo.	fin-cast...	sing...	Bosch.....	auto....
Palmer-Moore.....M	2,000	1,350	126	pr-steel..	rigid....	solid....	36x3½	36x4	wood-sq.	3	4-3⅞x5⅛	22.50	block...	right...	thermo	fin-cast...	sing...	Bosch.....	auto....
Peerless.....TC2	4,000	.....	145	.....	.....	solid....	36x4	36x4d	.....	3	4-4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy.....	hand....
Peerless.....TC3	6,000	.....	151*	.....	.....	solid....	36x4	40x4d	.....	3	4-4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy.....	hand....
Peerless.....TC4	8,000	.....	151*	.....	.....	solid....	36x5	40x5d	.....	3	4-4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy.....	hand....
Peerless.....TC5	10,000	.....	151*	.....	.....	solid....	38x6	42x6d	.....	3	4-4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy.....	hand....
Peerless.....TC6	12,000	.....	151*	.....	.....	solid....	38x7	42x7d	.....	3	4-4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy.....	hand....
Pennsy.....15	1,000	660	98	pr-steel..	.....	pneu....	30x3½	31x4	wood-ov.	2	4-4⅛x4½	27.20	block...	right...	thermo.	fin-sheet...	sing...	Dixie.....	fixed....
Pierce-Arrow.....	4,000	3,000	150*	pr-steel..	flexible..	solid....	36x4	36x4d	wood-ov.	3	4-4x5½	25.60	pairs....	opp....	cent...	fin-cast....	sing...	Eisemann*.	hand....
Pierce-Arrow.....	10,000	4,500	168*	pr-steel..	flexible..	solid....	36x5	40x6d	wood-ov.	3	4-4⅛x6	38.25	pairs....	opp....	cent...	fin-cast....	dual..	Bosch*....	hand....
Pullman.....4-24	1,000	.....	114	pr-steel..	semi-flx..	pneu....	31x4	31x4	wood-ov.	3	4-3⅞x4¼	22.50	block...	left....	thermo.	cell-sheet..	sing...	Dixie.....	hand....
Rainier.....	1,000	850	115	pr-steel..	rigid....	pneu....	33x4	33x4	wood-sq.	2	4-3¼x4½	16.92	block...	left....	thermo.	fin-sheet...	sing...	Dixie.....	hand....
Reo.....F	1,500	1,000	120	pr-steel..	rigid....	pneu....	34x4½	34x4½	wood-ov.	3	4-4⅛x4½	27.20	pairs....	r&h....	cent...	fin-sheet...	sing...	Remy.....	hand....
Reo.....J	4,000	1,650	146	pr-steel..	rigid....	solid....	36x4	36x3½d	wood-sq.	3	4-4⅛x4½	27.20	pairs....	r&h....	cent...	fin-cast....	dual..	National..	hand....
Republic.....9	1,500	750	120	pr-steel..	flexible..	cush....	32x3	32x3½	wood-sq.	2	4-3½x5	16.92	block...	left....	thermo.	sq-t-cast...	sing...	Bosch.....	fixed....
Republic.....10	2,000	.....	124	pr-steel..	semi-flx..	solid....	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	fixed....
Republic.....11	3,000	.....	144	pr-steel..	semi-flx..	solid....	34x3	34x5	wood-sq.	3	4-3⅜x5	22.50	block...	left....	thermo.	cell cast...	sing...	Bosch.....	fixed....
Republic.....12	4,000	.....	144*	pr-steel..	semi-flx..	solid....	34x4	34x6	wood-sq.	3	4-4⅛x5½	27.20	block...	left....	cent...	cell-cast...	sing...	Bosch.....	fixed....
Republic.....T	6,000	.....	165*	pr-steel..	semi-flx..	solid....	36x5	36x5d	cast-d...	3	4-4¼x5½	29.00	block...	left....	cent...	cell-cast...	sing...	Bosch.....	hand....
Riker.....	6,000	3,500	150*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq.	5	4-4¼x6	29.00	pairs....	opp....	cent...	fin-cast....	dual..	Bosch.....	hand....
Riker.....	8,000	3,650	150*	pr-steel..	rigid....	solid....	36x5	36x6d	wood-sq.	5	4-4¼x6	29.00	pairs....	opp....	cent...	fin-cast....	dual..	Bosch.....	hand....
Royal.....	2,000	.....	124*	rolled-c..	.....	solid....	34x4	34x5	wood-sq.	3	4-3½x5	16.92	block...	left....	cent...	cell-cast...	sing...	Bosch.....	fixed....
Royal.....	5,000	.....	132*	rolled-c..	.....	solid....	36x4½	36x6	wood-sq.	3	4-4x6	25.60	block...	left....	cent...	cell-cast...	sing...	Bosch.....	fixed....
Royal.....	7,000	.....	158*	rolled-c..	.....	solid....	36x5	38x5d	wood-ov.	3	4-4¼x6	29.00	block...	left....	cent...	cell-cast...	sing...	Bosch.....	fixed....

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p.m.	Truck in m. p. h.	Carburetor Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds						Steer	Levers	
s&l-2	Bosch	250.00	cent	motor	own	1,000	14⅛	Stmbg	grav	seat	dry-p	selec	unit-j	3	8.40–1*	dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Mack AC
s&l-2	Bosch	250.00	cent	motor	own	1,000	10½	Stmbg	grav	seat	dry-p	selec	unit-j	3	11.58-1*	dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Mack AC
s&l-2	Bosch	250.00	cent	motor	own	1,000	9⅓	Stmbg	grav	seat	dry-p	selec	unit-j	3	12.42-1*	dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Mack Tractor AC
s&l-2	Bosch	250.00	cent	motor	own	1,000	10½	Stmbg	grav	seat	dry-p	selec	unit-j	3	11.58-1*	dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Mack Tractor AC
s&l-2	Bosch	250.00	cent	motor	own	1,000	8½	Stmbg	grav	seat	dry-p	selec	unit-j	3	14.10-1*	dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Mack Tractor AC
s&l	Huff-S	stock	none					K. D	grav	dash	cone	selec	unit-m	3	3.59–1	bevel	springs	tor-t	int-r-w	ext-r-w	left	cent	Maxwell 25
none			cent	d-shaft	own	900	25	Stmbg	grav	seat	dry-d	selec	unit-m	3		worm	rad-r	springs	int-r-w	int-r-w	left	cent	Menominee EW
none			cent	d-shaft	own	850	16	Stmbg	grav	seat	dry-d	selec	unit-m	3		worm	rad-r	springs	int-r-w	int-r-w	left	cent	Menominee FW
none			cent	d-shaft	own	800	15	Stmbg	grav	seat	dry-d	selec	unit-m	3		worm	rad-r	springs	int-r-w	int-r-w	left	cent	Menominee H
none			cent	d-shaft	own	750	14	Stmbg	grav	seat	dry-d	selec	unit-m	3		worm	rad-r	springs	int-r-w	int-r-w	left	cent	Menominee D
none					own	750	12	Stmbg	grav	seat			amid	3		worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Menominee G
lighting	Bosch	stock	cent	motor	Pierce	800	12	Stmbg	grav	seat	dry-p	ind-c	unit-j	3	14.00–1	dbl chn	rad-rd		ext-j-s	int-r-w	right	right	Mercury-Bulley Trac A
lighting	Westghs	75.00	cent	motor	Pierce	1,075	18	Ensign	grav	seat	dry-d	selec	unit-m	3	6.00–1	worm	springs	springs	int-r-w	ext-r-w	right	cent	Moreland 15-D
lighting	Westghs	75.00	cent	motor	Pierce	1,200	18	Ensign	grav	seat	dry-d	selec	unit-m	3	6.75–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Moreland 15-B
lighting	Westghs	75.00	cent	motor	Pierce	1,100	15	Ensign	grav	seat	dry-d	selec	unit-m	4	7.00–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Moreland 15-C
lighting	Westghs	75.00	cent	motor	Pierce	890	12½	Ensign	grav	seat	dry-d	selec	amid	4	7.80–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Moreland 15-G
lighting	Westghs	75.00	cent	motor	Pierce	890	9	Ensign			dry-d	selec	amid	4	11.67–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Moreland 16-J
none					none	1,800	18	Stmbg	grav	seat	cone	selec	unit-j	3		dbl chn	rad-rd		int-r-w	int-r-w	left	l & c	Moon B
			suct	motor	Mon'rch	1,000	16	Ray			dry-d	selec	unit-m	3	6.75–1	worm					right	cent	Nelson & LeMoon E1
			suct	motor	Mon'rch	1,000	14	Ray			dry d	selec	unit-m	3	8.75–1	worm					right	cent	Nelson & LeMoon E2
			suct	motor	Mon'rch	1,000	12	Ray			dry-d	selec	unit-m	3	8.75–1	worm					right	cent	Nelson & LeMoon E3
s,l&i	G & D	200.00			none	1,800	15	Zenith	grav	seat	dry-d	selec	unit-m	3	8.50–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Netco D
s,l&i	G & D	200.00			none			Zenith	grav	seat	dry-d	prog	unit-m	3	8.50–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Netco E
			cent	motor	Pierce	1,400	18	Stmbg	grav	seat	dry-p	ind-c	unit-m	3	7.75–1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	New York M
opt			cent	motor	Pierce	1,573	25	Stmbg	grav	seat	dry-d	selec	unit-m	3	6.50–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Niles B
opt			cent	motor	Pierce	1,173	15	Stmbg	grav	seat	dry-p	selec	amid	3	8.50–1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Niles E
s&l-2	Dyneto	stock				960	16	Carter	grav	seat	cone	selec	unit-m	3	6.00–1	bevel	tor-t	tor-t	int-r-w	ext-r-w	left	cent	Old Hickory
lighting		stock						Stmbg	grav	dash	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	right	r & c	Old Reliable
lighting		stock	cent	duplex	Duplex			Stmbg	grav	dash	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Old Reliable
								Stmbg	grav	seat	wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	right	right	Old Reliable
lighting		stock	cent	duplex	Duplex			Stmbg	vac		dry-d	selec	unit-m	3	8.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Old Reliable
lighting		stock	cent	duplex	Duplex			Stmbg	vac		dry-d	selec	amid	4	8.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Old Reliable
lighting		stock						Stmbg	grav	seat	wet-d	selec	amid	3		dbl chn	rad-rd		ext	int	right	right	Old Reliable
lighting		stock	cent	duplex	Duplex			Stmbg	grav	seat	wet-d	selec	amid	3		dbl chn	rad-rd		ext-r-w	int-j-s	right	right	Old Reliable
lighting		stock	cent	duplex	Duplex			Stmbg	grav		wet-d	selec	unit-j	4		dbl chn	rad-rd		int-r-w	ext-j-s	right	right	Old Reliable
s,l&i-2		stock			none				grav	dash	cone	selec	unit-x	3		bevel	tor-t	tor-t	ext-r-w	ext-r-w	left	cent	Overland 75-B
s,l&i-2		stock			none				grav	seat	cone	selec	unit-x	3		bevel	tor-t	tor-t	ext-r-w	ext-r-w	left	cent	Overland
s&l-2	Bijur	180.00	cent	motor	own	1,000	16	own	pres	seat	dry-d	prog	amid	3	6.25–1	worm	rad-rd	t-arm	int-r-w	ext-sht	left	left	Packard 1-D
s&l-2	Bijur	180.00	cent	motor	own	1,000	16	own	pres	seat	dry-d	prog	amid	3	6.25–1	worm	rad-rd	t-arm	int-r-w	ext-sht	left	left	Packard 1½-D
s&l-2	Bijur	180.00	cent	motor	own	1,000	14	own	pres	seat	dry-d	prog	amid	3	7.25–1	worm	rad-rd	t-arm	int-r-w	ext-sht	left	left	Packard 2-D
s&l-2	Bijur	180.00	hydr	motor	own	1,000	12	own	pres	seat	dry-d	prog	amid	3	9.00–1	worm	rad-rd	t-arm	int-r-w	ext-sht	left	left	Packard 3-D
s&l-2	Bijur	180.00	hydr	motor	own	1,000	12	own	pres	seat	dry-d	prog	amid	3	10.00–1	worm	rad-rd	t-arm	int-r-w	ext-sht	left	left	Packard 4-D
none					none	1,500	29	Carter	grav	dash	none	frict	unit-j	3	4.25–1	dbl chn	rad-rd		int-r-w	int-r-w	left	left	Packet
none					none		18	Stmbg	grav	seat	dry-d	selec	unit-m	3		int-g	springs	springs	int-r-w	ext-r-w	left	cent	Palmer
none			cent	motor	Pierce	1,000	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Palmer
s&l*	opt		suct	motor	Mon'rch	1,275	20	Zenith	grav	seat	dry-d	selec	amid	3	6.83–1	int-g	springs	t-arm	int-r-w	ext-r-w	left	cent	Palmer-Moore K
s&l*	opt		suct	motor	Mon'rch	1,150	18	Zenith	grav	seat	dry-d	selec	amid	3	6.83–1	int-g	springs	t-arm	int-r-w	ext-r-w	left	cent	Palmer-Moore M
			cent	motor				Stmbg			cone	selec	amid	3	6.00–1	worm	springs	springs			right	right	Peerless TC2
			cent	motor		925	14½	Stmbg			cone	selec	unit-j	4	7.45–1	dbl chn	rad-rd				right	right	Peerless TC3
			cent	motor				Stmbg			cone	selec	unit-j	4	8.70–1	dbl chn	rad-rd				right	right	Peerless TC4
			cent	motor				Stmbg			cone	selec	unit-j	4	10.50–1	dbl chn	rad-rd				right	right	Peerless TC5
			cent	motor				Stmbg			cone	selec	unit-j	4	10.50–1	dbl chn	rad-rd				right	right	Peerless TC6
	Dyneto	75.00			none	2,200	42½	Zenith	grav	seat	dry-d	selec	unit-m	3	4.75–1	bevel	springs	springs	int	ext	left	cent	Pennsy 15
			cent	motor	own	1,050	16	own	grav	seat	cone	selec	amid	3	7.00–1*	worm	rad-rd	t-arm	int-r-w	ext-sht	right	right	Pierce-Arrow
			cent	motor	own	950	14	own	grav	seat	cone	selec	amid	3	7.80–1*	worm	rad-rd	t-arm	int-r-w	ext-sht	right	right	Pierce-Arrow
s&l-2	Apple	stock			none	2,800	35	Stmbg	grav	dash	wet-d	selec	unit-m	3	4.25-1	bevel	springs	t-arm	int-r-w	ext-r-w	left	cent	Pullman 4-24
s&l	Spltdrf	85.00			none	2,500	42	Carter	grav	seat	dry-p	selec	unit-m	3	5.80–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Rainier
s&l-2	Remy	stock			none			Johns	grav	dash	dry-d	selec	amid	3	4.30–1	sp-bev	springs	t-arm	none	2 s-r-w	left	cent	Reo F
			hydr	motor	own	1,250	14	Johns	grav	seat	dry-d	selec	amid	3	8.70–1	dbl chn	rad-rd		ext-r-w	ext-j-s	left	cent	Reo J
lighting	Bosch	stock	suct	motor	Ruggles	1,050	20		grav	dash	dry-d	selec	unit-m	3	5.36–1	int-g	springs	springs	ext-sht	int-r-w	left	cent	Republic 9
s&l-2	Bosch		suct	motor	Ruggles	1,050	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	7.00–1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Republic 10
s&l-2	Bosch		suct	motor	Ruggles	1,200	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	8.00–1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Republic 11
s&l-2	Bosch		suct	motor	Ruggles	950	12	Stmbg	grav	seat	dry-d	selec	unit-m	3	8.00–1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Republic 12
s&l-2	Bosch		suct	motor	Ruggles	1,025	10	Stmbg	grav	seat	dry-d	selec	unit-m	4	11.00–1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Republic T
s&l-2	Westghs	225.00	l-b	motor	own	1,180*	14½	own	grav	seat	cone	selec	amid	4	10.00–1	worm	rad-rd	t-arm	int-r-w	ext-sht	right	right	Riker
s&l-2	Westghs	225.00	l-b	motor	own	1,350*	14½	own	grav	seat	cone	selec	amid	4	10.00–1	worm	rad-rd	t-arm	int-r-w	ext-sht	right	right	Riker
starting		stock	suct	motor	Mon'rch	1,600*	25*	Master	grav	seat	dry-p	ind-c	amid	3		worm	springs	springs	int-r-w	int-r-w	right	right	Royal
starting		stock	suct	motor	Mon'rch	1,600	18	Master	grav	seat	dry-p	ind-c	amid	3		worm	springs	springs	int-r-w	int-r-w	right	right	Royal
starting		stock	suct	motor	Mon'rch	1,600	15	Master	grav	seat	dry-p	ind-c	amid	3		worm	springs	springs	int-r-w	int-r-w	right	right	Royal

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, *c't, centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individu clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR							IGNITION		
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		Typ	Make	Spark Advance
							Front	Rear							Water Circulation	Radiator Core and Case			
Royal	10,000		168*	rolled-c.		solid	36x6	40x6d	wood-ov.	3	4-4¾x5½	36.15	pairs	opp	cent	cell-cast	sing.	Bosch	fixed
Royal	12,000		158*	rolled-c.		solid	36x6	40x6d	wood-ov.	3	4-5⅛*x6*	42.20*	pairs	opp	cent	cell-cast	sing.	Bosch	fixed
Royal	14,000		158*	rolled-c.		solid	36x7	40x7d	wood-ov.	3	4-5¼x7	44.20	pairs	opp	cent	cell-cast	sing.	Bosch	fixed
Rush D	1,000	$ 695	105	pr-steel	flexible	pneu	31x4	31x4	wood-ov.	2	4-3¼x5	16.92	block	right	thermo.	fin-cast	sing.	Conn	hand
Sanford O	2,000	1,290	120	pr-steel	flexible	pneu*	34x4½*	35x5*	wood-sq.	3	4-3½x5½	19.61	block	right	thermo.	fin-cast	sing.	Dixie	fixed
Sanford R	3,000	1,370	138	pr-steel	semi-flx	solid*	36x3½*	36x4*	wood-sq.	3	4-3½x5½	19.61	block	right	thermo.	fin-cast	sing.	Dixie	fixed
Sanford S	4,000	2,100	150*	rolled-c.	flexible	solid	36x4	36x7	wood-sq.	3	4-4¼x5½	29.00	block	right	cent	fin-cast	sing.	Dixie	fixed
Saurer L	10,000	4,800	153½	pr-steel	semi-flx	solid	36x5	42x5d	wood-sq.	3	4-4⅝x5½	34.28	pairs	opp	cent	cell-sheet	sing.	Bosch	hand
Saurer M	13,000	5,800	156½	pr-steel	semi-flx	solid	36x5	42x6d	wood-sq.	3	4-4⅝x5½	34.28	pairs	opp	cent	cell-sheet	sing.	Bosch	hand
Schleicher	6,000	3,500	150*	rolled-c.	rigid	solid	34x4½	34x3½d	wood-ov.	3	4-4¼x5½	29.00	pairs	right	cent	sq-t-sheet	dual-d	Bosch	hand
Schleicher	10,000	4,500	150*	rolled-c.	rigid	solid	34x5	34x4d	wood-ov.	3	4-5x6	40.00	pairs	right	cent	sq-t-sheet	dual-d	Bosch	hand
Selden G	1,500	985	110	pr-steel	semi-flx	pneu	32x3½	33x4	wood-sq.	2	4-3½x4½	15.64	block	right	thermo.	sq-t-sheet	sing.	Dixie	fixed
Selden TL	2,000	1,700	126½	pr-steel	semi-flx	solid	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block	right	thermo.	sq-t-sheet	sing.	Bosch	fixed
Selden JC	4,000	2,000	150	pr-steel	semi-flx	solid	36x4	36x6	wood-sq.	3	4-3¾x5½	22.50	block	left	cent	sq-t-sheet	sing.	Bosch	fixed
Selden JWW	4,000	2,250	150	pr-steel	semi-flx	solid	36x4	36x6	wood-sq.	3	4-4⅛x5¼	27.20	block	left	cent	sq-t-sheet	sing.	Bosch	fixed
Selden N	7,000	2,950	164	pr-steel	semi-flx	solid	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent	sq-t-cast	sing.	Eisemann	hand
Service 120	2,000	1,375	135	pr-steel	flexible	solid*	34x3*	34x4*	wood-sq.	3	4-3½x5⅛	19.61	block	right	thermo.	fin-cast	sing.	Bosch	hand
Service 130	3,000	1,950	150	pr-steel		solid	36x3½	35x5	wood-sq.	3	4-4⅛x5½	27.20	block	right	cent	fin-cast	sing.	Eisemann	hand
Service 140	4,000	2,250	160*	pr-steel	rigid	solid	36x4	36x7	wood-sq.	3	4-4⅛x5½	27.20	block	right	cent	fin-cast	sing.	Eisemann	hand
Service 170	7,000	3,000	170*	pr-steel	rigid	solid	36x5	36x5d	wood-sq.	3	4-4¼x5½	29.00	block	right	cent	fin-cast	sing.	Eisemann	hand
Service 175	7,000	3,250	170*	pr-steel	rigid	solid	36x5	36x5d	wood-sq.	3	4-4½x6	32.40	block	right	cent	fin-cast	sing.	Eisemann	hand
Service 200	10,000	4,000	170*	pr-steel	rigid	solid	36x6	40x6d	wood-sq.	3	4-4½x6	32.40	block	right	cent	fin-cast	sing.	Eisemann	hand
Signal F	2,000	1,550	144*	pr-steel	semi-flx	solid	34x3	36x4	wood-sq.	3	4-3¾x5½	22.50	block	left	cent	fin-cast	sing.	Eisemann	fixed
Signal H	3,000	1,800	144*	pr-steel	semi-flx	solid	34x3½	36x5	wood-sq.	3	4-4⅛x5¼	27.20	block	left	cent	fin-cast	sing.	Eisemann	fixed
Signal J	4,000	2,100	150*	pr-steel	semi-flx	solid	34x4	36x4d	wood-sq.	3	4-4⅛x5¼	27.20	block	left	cent	fin-cast	sing.	Eisemann	fixed
Signal M	7,000	3,000	168	pr-steel	semi-flx	solid	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing.	Eisemann	fixed
Signal R	10,000	4,000	180	pr-steel	semi-flx	solid	36x6	40x6d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing.	Eisemann	fixed
Standard 70	4,000	2,000	140			solid	36x4	36x6		3	4-4¼x5½	27.20	block	left	cent	fin-sheet	sing.	Eisemann	auto
Standard 60	7,000	2,850	144*			solid	36x5	36x5d		3	4-4½x5½	32.40	pairs	left	cent	fin-sheet	sing.	Eisemann	auto
Standard 40	8,000	3,025	144*			solid	36x5	36x5d		3	4-4½x5½	32.40	pairs	left	cent	fin-sheet	sing.	Eisemann	auto
Standard 50	10,000	3,400	144*			solid	36x5	40x6d		3	4-4¼x5¼	29.00	pairs	left	cent	fin-sheet	sing.	Eisemann	auto
Steele C	4,000	2,250	115*	rolled-c.	semi-flx	solid	38x5	40x4d	cast-cr.	3	4-4¼x5¼	27.20	block	right	cent	cell-sheet	sing.	At Kent	auto
Steele B	6,000	3,000	127*	rolled-c.	semi-flx	solid	38x6	40x5d	cast-cr.	3	4-5x5	40.00	pairs	head	cent	cell-sheet	sing.	At Kent	auto
Steele BA	8,000	3,500	127*	rolled-c.	semi-flx	solid	38x6	40x5d	cast-cr.	3	4-5x5	40.00	pairs	head	cent	cell-sheet	sing.	At Kent	auto
Steele A	10,000	4,000	127*	rolled-c.	semi-flx	solid	38x7	40x6d	cast-cr.	3	4-5x5	40.00	pairs	head	cent	cell-sheet	sing.	At Kent	auto
Sterling	5,000	2,800	156*	pr-steel	rigid	solid	36x4	36x4d*	wood-sq.	3	4-4¼x5⅜	29.00	pairs	right	cent	fin-cast	sing.	Eisemann	auto
Sterling	7,000	3,400	158*	pr-steel	rigid	solid	36x5	36x5d	wood-sq.	3	4-4¼x5⅜	29.00	pairs	right	cent	fin-cast	sing.	Eisemann	auto
Sterling	10,000	4,500	168	pr-steel		solid	36x5	40x6d	wood-sq.	3	4-4⅜x6⅛	36.15	pairs	right	cent	fin-cast	dual	Eisemann	auto
Sterling	14,000	4,750	168	pr-steel		solid	36x6	40x7d	wood-sq.	3	4-4¾x6¾	36.15	pairs	opp	cent	fin-cast	dual	Eisemann	auto
Stewart 5	1,000	695	106	pr-steel	semi-flx	pneu	32x4	32x4	wood-ov.	2	4-3x4½	14.40	block	l & h	thermo.	fin-sheet	sing.	Dixie	fixed
Stewart 3	1,500	1,290	118	pr-steel	semi-flx	pneu	34x4½	34x4½	wood-ov.	3	4-3½x5⅛	19.61	block	right	thermo.	fin-sheet	sing.	Dixie	fixed
Stewart 4	2,500	1,390	128	pr-steel	semi-flx	solid	35x3	35x4	wood-sq.	3	4-3½x5⅛	19.61	block	right	thermo.	fin-sheet	sing.	Dixie	fixed
Studebaker SF	1,000	785	112	pr-steel	rigid	pneu	34x4	34x4	wood-ov	3	4-3⅞x5	24.22	block	left	cent	fin-sheet	sing.	Remy	hand
Studebaker 7	2,000	1,100	125	pr-steel	rigid	pneu	35x5	35x5	wood-ov.	3	4-3⅞x5	24.22	block	left	cent	fin-sheet	sing.	Remy	hand
Sullivan G	3,000	1,650	129	rolled-c.	semi-flx	solid	36x3	36x4	wood-sq.	2	4-3⅞x4½	22.50	block	right	thermo.	fin-sheet	sing.	Bosch	fixed
Sullivan E	4,000	2,250	150	pr-steel	semi-flx	solid	36x4	36x6	wood-sq.	3	4-4⅛x5½	27.20	block	right	cent	fin-sheet	sing.	Bosch	fixed
Superior A	2,000	1,350	124*	pr-steel		solid	34x3½	34x4	wood-sq.	3	4-3½x5	19.61	block	head	thermo.	sq-t-sheet	sing.	Eisemann	fixed
Superior C	4,000	1,800	144	pr-steel		solid	36x4	36x6	wood-sq.	3	4-3¾x5	22.50	block	head	gear	sq-t-sheet	sing.	Eisemann	fixed
Thomas 40	5,000	2,700	150*	pr-steel	semi-flx	solid	34x4	34x4d	wood-sq.	3	4-4⅛x5½	27.20	block	left	cent	cell-sheet	sing.	Bosch	fixed
Tiffin A	1,500	1,190	110	pr-steel	flexible	pneu*	35x4½*	35x4½*	wood-ov.	2	4-3½x5	19.61	block	right	thermo.	fin-sheet	sing.	Bosch	hand
Tiffin AW	2,000	1,450	112	pr-steel	flexible	solid	34x3	34x4	wood-sq.	2	4-3½x5	19.61	block	right	thermo.	fin-sheet	sing.	Bosch	hand
Tiffin GW	3,000	1,790	135	pr-steel	flexible	solid	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block	left	cent	fin-sheet	sing.	Bosch	hand
Tiffin MC	5,000	2,360	140	pr-steel	semi-flx	solid	36x4	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block	left	cent	fin-sheet	sing.	Bosch	hand
Tiffin MW	5,000	2,500	140	pr-steel	semi-flx	solid	36x4	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block	left	cent	fin-sheet	sing.	Bosch	hand
Tiffin RW	10,000	4,250	168	rolled-I	semi-flx	solid	36x5	40x5d	wood-sq.	3	6-3⅞x5½	33.75	threes	right	cent	fin-sheet	sing.	Bosch	hand
Tiffin SW	12,000	4,550	168	rolled-I	semi-flx	solid	36x6	40x6d	wood-sq.	3	6-3¾x5¼	33.75	threes	right	cent	fin-sheet	sing.	Bosch	hand
Transport Tractor T	10,000	2,500	80	rolled-c.	rigid	solid	34x3½	34x4d	wood-ov.	3	4-3¼x5⅛	19.61	block	right	thermo.	cell-sheet	sing.	Bosch	fixed
Union B	5,000	1,875	150	pr-steel	flexible	solid	39x4	39x6	wood-sq.	4	4-4x6	25.60	block	left	cent	fin-cast	sing.	Eisemann	hand
United BSW	4,000	2,250	144*	rolled-c.	rigid	solid	36x4	36x4d	wood-sq.	3	4-4¼x5½	27.20	block	left	cent	cell-cast	sing.	Eisemann	hand
United CSW	7,000	2,900	144*	rolled-c.	rigid	solid	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent	cell-cast	sing.	Eisemann	hand
United DSW	8,000	3,300	144*	rolled-c.	rigid	solid	36x5	36x6d	wood-sq.	3	4-4½x5½	36.15	pairs	opp	cent	cell-cast	sing.	Eisemann	hand
United ESW	10,000	3,900	144*	rolled-c.	rigid	solid	36x6	40x6d	cast-cr.	3	4-5 1/16x5½	41.62	pairs	opp	cent	fin-cast	sing.	Eisemann	hand
U. S. E	4,000	2,200	132*	rolled-c.	semi-flx	solid	34x3½	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block	left	cent	sq-t-sheet	dual	Bosch	hand
U. S. H	4,000	2,500	144*	rolled-c.	semi-flx	solid	34x4	36x4d	wood-sq.	3	4-4¼x5½	27.20	block	left	cent	sq-t-sheet	dual	Bosch	hand
U. S. D	6,000	2,700	144*	rolled-c.	semi-flx	solid	34x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent	sq-t-sheet	dual	Bosch	hand
U. S. J	7,000	3,150	156*	rolled-c.	semi-flx	solid	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent	sq-t-sheet	dual	Bosch	hand
U. S. K	10,000	4,000	168*	rolled-c.	semi-flx	solid	36x6	40x6d	wood-sq.	3	4-4½x6½	36.15	pairs	left	cent	sq-t-sheet	dual	Bosch	hand
Universal G	3,000	1,950	133*	rolled-c.	rigid	solid	34x3½	34x5	wood-ov.	2	4-3⅞x5¼	22.50	block	right	thermo.	fin-cast	dual	Eisemann	
Universal D	4,000	2,800	132*	rolled-c.	rigid	solid	36x4	36x4d	wood-ov.	3	4-4x5½	25.60	pairs	opp	cent	cell-sheet	dual	Eisemann	
Universal A	6,000	3,400	132*	rolled-I	rigid	solid	36x5	36x5d	wood-ov.	3	4-4x5½	25.60	pairs	opp	cent	cell-sheet	dual	Eisemann	hand
Velie 25	4,000	2,250	150*	pr-steel	flexible	solid	36x4	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block	left	cent	fin-cast	sing.	Bosch	hand
Velie 26	7,000	3,350	172*	pr-steel	flexible	solid	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing.	Bosch	hand

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page)**

Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET			Total Gear Reduction in High							Name and Model
Type	Make	Extra Cost	Type	Drive	Makes	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds		Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	
starting		stock...	suct..	motor..	Mon'rch.	900*	10*	Master.	grav.	seat..	wet-d.	ind-c.	amid...	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	**Royal**
.....	.....	.....	suct..	motor..	Mon'rch.	900*	10*	Master.	grav.	seat..	wet-d.	ind-c.	amid...	3	.....	worm*.	sp'gs*.	sp'gs*.	int-r-w.	int-r-w.	right.	right.	**Royal**
.....	.....	.....	suct..	motor..	Mon'rch.	900*	10*	Master.	grav.	seat..	wet-d.	ind-c.	amid...	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	right.	right.	**Royal**
s&l-2...	Spltdorf.	stock...	.....	.....	.....	1,600	29	Carter..	grav.	seat..	dry-d..	selec.	unit-m.	3	4.42–1	bevel...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	**Rush** D
.....	.....	.....	.....	.....	.....	1,100	16	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Sanford** O
.....	.....	.....	cent..	motor..	Pierce...	1,150	14	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	8.99–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-r-w.	left..	cent.	**Sanford** R
.....	.....	.....	.....	.....	.....	1,175	14	Scheb..	grav.	.....	dry-d..	selec.	unit-m.	3	9.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	**Sanford** S
none...	.....	.....	cent..	motor..	own....	1,000	8*	own....	pres.	rear..	cone..	selec.	unit-j..	4	15.85-1*	dbl chn.	.rad-rd.	.....	int-r-w.	ext-sht.	right.	right.	**Saurer** L
none...	.....	.....	cent..	motor..	own....	1,000	9½*	own....	pres.	rear..	cone..	selec.	unit-j..	4	14.80-1*	dbl chn.	.rad-rd.	.....	int-r-w.	.....	right.	right.	**Saurer** M
none...	.....	.....	.....	.....	opt.....	1,200	25	Stmbg..	grav.	seat..	.....	.....	.....	.....	.....	dbl chn.	rad-rd..	.....	ext-r-w.	ext-sht.	right.	right.	**Schleicher**
none...	.....	.....	.....	.....	.....	1,200	20	Stmbg..	grav.	seat..	cone..	selec.	amid...	4	5.00–1	dbl chn.	rad-rd..	.....	ext-r-w.	ext-sht.	right.	right.	**Schleicher**
s&l...	N-East..	80.00	cent..	motor..	Milwkee.	1,200	20	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.20–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	**Selden** G
s&l-2*..	N-East..	175.00	cent..	motor..	Pierce...	1,135	17	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	**Selden** TL
s&l-2*..	N-East..	150.00	cent..	motor..	Pierce...	1,295	14¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	9.45–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left*.	cent	**Selden** JC
s&l*..	N-East..	.....	cent..	motor..	Pierce...	1,295	15	Stmbg..	grav.	seat..	dry-d.	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left*.	cent	**Selden** JWW
s&l-2*..	N-East..	175.00	cent..	motor..	Pierce...	1,250	13	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	4	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent..	**Selden** N
s&l-2*..	Westghs.	160.00*	cent..	d-shaft.	Pierce...	1,200	18	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Service** 120
s&l-2*..	Westghs.	200.00*	cent..	d-shaft.	Pierce...	1,090	14	Stmbg..	vac..	.....	dry-p..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Service** 130
s&l-2*..	Westghs.	200.00*	cent..	d-shaft.	Pierce...	1,090	14	Stmbg..	vac..	.....	dry-p..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Service** 140
s&l-2*..	Westghs	200.00*	cent	d-shaft.	Pierce...	1,090	12	Stmbg..	vac..	seat..	dry-p..	selec.	unit-m.	4	8.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	**Service** 170
s&l-2*..	Westghs.	200.00*	cent..	d-shaft.	Pierce...	1,000	14	Stmbg..	vac..	seat..	dry-p..	selec.	unit-m.	4	8.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	**Service** 175
s&l-2*..	Westghs.	200.00*	cent..	d-shaft.	Pierce...	1,000	10	Stmbg..	vac..	seat..	dry-p..	selec.	unit-m.	4	8.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent .	**Service** 200
.....	.....	.....	suct..	motor..	Mon'rch.	1,100	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Signal** F
.....	.....	.....	suct..	motor..	Mon'rch.	1,200	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	**Signal** H
.....	.....	.....	suct..	motor..	Mon'rch.	1,300	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	9.25–1	worm..	rad-rd..	springs.	int.....	int.....	left..	cent..	**Signal** J
.....	.....	.....	suct..	motor..	Mon'rch.	1,300	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	**Signal** M
.....	.....	.....	suct..	motor..	Mon'rch.	1,700	15	Stmbg..	grav.	seat..	dry-d..	selec.	amid...	4	13.66–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	**Signal** R
.....	.....	.....	suct..	motor..	Mon'rch.	1,100	15	Scheb..	.....	.....	cone..	selec.	amid...	3	7.75–1	worm..	rad-rd..	.....	.....	.....	left..	cent..	**Standard** 70
.....	.....	.....	suct..	motor..	Mon'rch.	1,050	12	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	10.33–1	worm..	rad-rd..	.....	.....	.....	left..	cent.	**Standard** 60
.....	.....	.....	suct..	motor..	Mon'rch.	1,050	12	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	9.50–1	dbl chn.	rad-rd..	.....	.....	.....	left..	cent	**Standard** 40
.....	.....	.....	suct..	motor..	Mon'rch.	1,050	9	Stmbg..	.....	.....	dry-d.	selec.	unit-m.	3	13.00–1	worm..	rad-rd..	.....	.....	.....	left..	cent	**Standard** 50
lighting.	Carlton.	stock...	cent.	motor..	own....	1,150	14½	Stmbg..	.....	seat..	wet-d.	ind-c	unit-j..	3	9.52–1	dbl chn	rad-rd..	.....	int.....	ext....	right.	right.	**Steele** C
lighting.	Carlton.	stock...	cent..	motor..	own....	950	11	Stmbg..	grav.	seat..	wet-d.	ind-c	unit-j..	3	9.21–1	dbl chn	rad-rd..	.....	int.....	ext....	right.	right.	**Steele** B
lighting.	Carlton..	stock...	cent..	motor..	own....	950	11	Stmbg	grav.	seat..	wet-d.	ind-c	unit-j..	3	9.21–1	dbl chn	rad-rd..	.....	int-r-w.	ext-j-s.	right.	right.	**Steele** BA
lighting.	Carlton	stock...	cent	motor..	own....	950	9	Stmbg..	grav.	seat..	wet-d.	ind-c	unit-j..	3	9.58–1	dbl chn	rad-rd..	.....	int-r-w.	ext-j-s.	right.	right	**Steele** A
lighting.	.....	35.00	cent..	motor..	Wauk'a.	1,040	14½	Holley..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.70–1	worm..	springs.	springs.	int-r-w.	int.....	left..	cent	**Sterling**
lighting.	.....	35.00	cent..	motor..	Wauk'a.	1,040	13	.....	grav.	.....	dry-d..	selec.	unit-m.	3	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent.	**Sterling**
lighting.	.....	35.00	cent..	motor..	Wauk'a.	950	12½	Holley..	grav.	.....	dry-d..	selec.	amid...	4	8.75–1	worm..	springs.	.....	int.....	int.....	left..	cent.	**Sterling**
lighting.	.....	35.00	cent..	motor..	Wauk'a.	950	10	.....	grav.	.....	dry-d..	selec.	amid...	4	11.67–1	dbl chn.	rad-rd..	.....	ext-sht.	int-r-w.	left..	cent..	**Sterling**
none...	.....	.....	.....	.....	none....	2,200	35	Zenith..	grav.	seat..	dry-p.	selec.	unit-m.	3	6.00–1	int-g...	springs.	springs	ext-r-w.	ext-r-w.	left..	cent	**Stewart** 5
s&l-2...	Westghs.	125.00	.....	.....	none....	2,100	35	Zenith..	grav.	seat..	dry-p..	selec.	unit-m.	3	6.00–1	int-g...	springs.	springs	int-r-w.	ext-r-w.	left..	cent.	**Stewart** 3
s&l-2...	Westghs.	125.00	.....	.....	none....	2,100	30	Zenith..	grav.	seat..	dry-p..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs	int-r-w.	ext-r-w.	left..	cent..	**Stewart** 4
s&l-2...	Wagner..	stock...	cent.	f-wheel.	Pierce...	925	20	Scheb..	vac..	rear..	cone..	selec.	unit-x..	3	4.60–1	bevel...	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent.	**Studebaker** SF
s&l-2...	Wagner..	stock...	cent..	f-wheel.	Pierce...	975	20	Scheb..	vac..	rear..	cone..	selec.	unit-x..	3	5.00–1	bevel...	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent.	**Studebaker** 7
.....	.....	.....	.....	.....	.....	.....	.....	Holley..	grav.	seat..	cone..	selec.	unit-j..	3	8.50–1	dbl chn.	rad-rd..	.....	int-r-w.	ext.....	left..	cent..	**Sullivan** G
.....	.....	.....	.....	.....	.....	.....	.....	Holley..	vac..	seat..	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Sullivan** E
none...	.....	.....	suct..	motor..	Mon'rch.	1,300	15	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	**Superior** A
none...	.....	.....	suct..	motor..	Mon'rch.	1,275	15	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	3	9.00–1	int-g...	rad-rd..	springs.	int-r-w.	ext-r-w.	left..	cent	**Superior** C
lighting.	Bosch...	stock...	cent..	duplex..	Duplex..	1,100	14	Bergen.	grav.	seat..	dry-d..	selec.	unit-m.	3	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent.	**Thomas** 40
none...	.....	.....	.....	.....	none....	1,000	15	Scheb..	grav.	seat..	cone..	selec.	unit-m.	3	6.80–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	**Tiffin** A
.....	.....	.....	cent..	motor..	Pierce...	1,000	15	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Tiffin** AW
.....	.....	.....	cent..	motor..	Pierce...	1,000	13½	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.60–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	**Tiffin** GW
.....	.....	.....	cent..	motor..	Pierce...	1,000	12	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.80–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-r-w.	left..	cent..	**Tiffin** MC
.....	.....	.....	cent..	motor..	Pierce...	1,000	12	Scheb..	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Tiffin** MW
s&l-2..	Bosch...	stock...	cent..	motor..	Pierce...	1,000	10½	Scheb..	grav.	seat..	dry-p..	selec.	amid...	3	11.70–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Tiffin** RW
s&l-2..	Bosch...	stock...	cent..	motor..	Pierce...	1,000	10½	Scheb..	grav.	seat..	dry-p..	selec.	amid...	3	11.70–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Tiffin** SW
.....	.....	.....	.....	.....	.....	.....	12	Zenith..	grav.	.....	dry-d..	selec.	unit-m.	4	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**Transport Tractor** T
none...	.....	.....	.....	.....	none....	.....	.....	Scheb..	grav.	dash.	wet-d.	selec.	unit-m.	3	7.75–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	right.	cent.	**Union** B
s&l...	opt.....	.....	suct..	motor..	Mon'rch.	1,125	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**United** BSW
s&l...	opt.....	.....	suct..	motor..	Mon'rch.	980	12	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent.	**United** CSW
s&l...	opt.....	.....	suct..	motor..	Mon'rch.	980	12	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	.....	cent..	**United** DSW
s&l-2*..	opt.....	200.00*	cent..	d-shaft.	Pierce...	987	10	Stmbg*	grav.	seat..	dry-d..	selec.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	**United** ESW
.....	.....	.....	cent..	motor..	Pierce...	1,170	15	Stmbg..	grav.	seat..	cone..	ind-c.	amid...	3	8.16–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-r-w.	left..	cent..	**U. S.** E
.....	.....	.....	cent..	motor..	Pierce...	1,190	15	Stmbg..	grav.	seat..	cone..	ind-c.	amid...	3	8.66–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**U. S.** H
.....	.....	.....	cent..	motor..	Pierce...	1,092	14	Stmbg..	grav.	seat..	cone..	ind-c.	amid...	3	8.01–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-r-w.	left..	cent..	**U. S.** D
.....	.....	.....	cent..	motor..	Pierce...	1,092	13	Stmbg..	grav.	seat..	cone..	ind-c.	amid...	3	11.70–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	**U. S.** J
.....	.....	.....	cent..	motor..	Wauk'a..	900	12¼	Stmbg..	grav.	seat..	cone..	ind-c.	amid...	3	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	**U. S.** K
lighting.	.....	stock...	l-b..	motor..	own....	1,160	15	Zenith..	grav.	seat..	dry-p..	selec.	unit-m.	3	7.25–1	worm..	rad-rd..	.....	int.....	int.....	left..	cent..	**Universal** G
lighting.	.....	stock...	l-b..	motor..	own....	1,057	12	Heath..	grav.	seat..	dry-d..	selec.	amid...	3	9.16–1	dbl chn.	rad-rd..	.....	ext.....	int.....	right.	right.	**Universal** D
lighting.	.....	stock...	l-b..	motor..	own....	1,057	12	Heath..	grav.	seat..	dry-d..	selec.	amid...	3	10.29–1	dbl chn.	rad-rd..	.....	ext-sht.	int-r-w.	right.	right.	**Universal** A
starting	Remy...	120.00	cent..	motor..	Pierce...	1,008	18	Stmbg..	vac..	seat..	dry-p..	selec.	amid...	4	6.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	**Velie** 25
none...	.....	.....	cent..	motor..	Pierce...	1,215	14	Stmbg..	cav..	seat..	dry-p..	selec.	amid...	4	10.30–1	worm..	rad-rd..	springs.	int.....	int.....	right.	right.	**Velie** 26

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure.* **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; **-f,** *to front wheels*; **-4,** *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME Material	FRAME Construction	TIRES Kind	TIRES SIZES IN INCHES Front	TIRES SIZES IN INCHES Rear	Wheels	MOTOR No. of Crankshaft Bearings	MOTOR Bore and Stroke	MOTOR N.A.C.C. Hp.	MOTOR Cylinders Cast	MOTOR Valves Placed	MOTOR COOLING Water Circulation	MOTOR COOLING Radiator Core and Case	MOTOR IGNITION Type	MOTOR IGNITION Make	MOTOR IGNITION Spark Advance
Walter.....C	7,000	$4,200	132*	pr-steel..	flexible..	solid....	40x6	40x6	cast-d...	3	4-4⅜x6	30.65	block...	left....	cent...	fin-cast....	sing...	Eisemann*.	auto....
Walter.....B	15,000	4,750	162*	pr-steel..	flexible..	solid....	36x6	40x6	cast-hol..	3	4-4⅜x6	30.65	block...	left....	cent...	fin-t-cast..	sing...	Eisemann*.	fixed....
Watson.....Tractor	10,000	3,600	80	rolled-c.	flexible..	solid....	34x4	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	dual..	Bosch.....	hand....
White.....GBBE	1,500	2,100	133½	pr-steel..	.....	pneu....	34x4½	34x4½	wood-ov.	2	4-3⅞x5½	22.50	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand....
White.....TBC	3,000	3,000	145½	pr-steel..	.....	pneu....	36x4½	36x4½d	wood-ov.	2	4-3⅞x5½	22.50	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand....
White.....TAD	6,000	3,700	163	rolled-I..	rigid....	solid....	36x5	40x5d	cast-x...	2	4-3⅞x5½	22.50	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand....
White.....TCD	10,000	4,500	169	rolled-I..	.....	solid....	36x5	40x6d.	cast-x...	3	4-4¼x6⅜	29.00	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand....
Wichita.....A	2,000	1,350	110*	pr-steel..	semi-flx..	solid....	34x3	34x4	wood-sq.	2	4-3½x5	16.92	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand....
Wichita.....K	2,000	1,650	118*	pr-steel..	semi-flx..	solid....	36x3	36x4	wood-sq.	2	4-3½x5	19.61	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand....
Wichita.....L	3,000	1,800	118*	pr-steel..	semi-flx..	solid....	36x3	36x5	wood-sq.	2	4-3½x5	19.61	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand....
Wichita.....B	4,000	2,100	118*	pr-steel..	semi-flx.	solid....	34x3½	34x6	wood-sq.	2	4-3½x5	19.61	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand....
Wichita.....R	5,000	2,350	144*	pr-steel..	semi-flx..	solid....	36x4	36x7	wood-sq.	3	4-3⅞x5½	22.50	block...	right...	cent...	cell-cast...	sing...	Bosch.....	hand....
Wichita.....O	7,000	3,250	165*	pr-steel..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch.....	hand....
Wichita.....Q	10,000	3,850	165*	pr-steel..	semi-flx..	solid....	38x6	38x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch.....	hand....
Wilcox.....S	2,000	1,600	128	pr-steel..	rigid....	pneu*....	35x5*	35x5*	wood-ov.	3	4-3⅞x5	22.50	block...	right...	thermo.	cell-sheet..	sing...	Bosch.....	hand....
Wilcox.....R	3,000	1,800	134	pr-steel..	rigid....	solid....	36x4	36x5	wood-ov.	3	4-4¼x5	29.00	pairs....	right...	cent...	cell-sheet..	sing...	Bosch.....	hand....
Wilcox.....Q	4,000	2,000	150*	pr-steel..	rigid....	solid....	36x4	36x3½d	wood-ov.	3	4-4¼x5	29.00	pairs....	right...	cent...	cell-cast...	sing...	Bosch.....	hand....
Wilcox.....P	7,000	2,900	154*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-ov.	3	4-4¼x5	29.00	pairs....	right...	cent...	cell-cast...	sing...	Bosch.....	hand....
Wilson.....E	4,000	2,350	144	rolled-c.	semi-flx..	solid....	36x4	36x4d	wood-ov.	3	4-4½x5½	27.20	block...	left....	cent...	fin-cast....	sing...	Eisemann..	fixed....
Witt Will.....WD16	2,000	2,000	120	pr-steel..	flexible..	solid*...	36x3*	36x4*	wood-sq.	3	4-3⅞x5½	22.50	block...	left....	cent...	sq-t-sheet..	sing...	Eisemann..	auto....
Witt Will.....WD16	4,000	2,500	144	pr-steel..	flexible..	solid....	36x3½	36x7	wood-sq.	3	4-4⅛x5½	27.20	block...	left....	cent...	sq-t-sheet..	sing...	Eisemann..	auto....
Wisconsin.....B	2,500	1,650	136	pr-steel..	semi-flx..	solid....	34x3½	34x4	wood-ov.	3	4-3½x4	19.61	block...	right...	cent...	cell-sheet..	sing...	Eisemann..	hand....
Wisconsin.....C	5,000	2,500	156*	pr-steel..	semi-flx..	solid....	36x4	36x6*	wood-ov.	3	4-4x5⅜	25.60	pairs....	right...	cent...	cell-sheet..	sing...	Eisemann..	hand....
W. S.....4	5,000	2,975	154	rolled-c.	flexible..	solid....	36x6	36x6	wood-sq.	3	4-4½x5½	32.40	pairs....	.....	cent...	fin-cast....	dual..	Nat'l.....	hand....
Zeitler & Lamson.....	3,000	1,850	150*	pr-steel..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4-4x5	25.60	block...	left....	cent...	cell-cast...	doub..	Bosch*....	hand....
Zeitler & Lamson.....	5,000	2,450	160*	pr-steel..	semi-flx..	solid....	36x4	36x7	wood-sq.	4	4-4x6	25.60	block...	left....	cent...	cell-cast...	doub..	Bosch*....	hand....
Zeitler & Lamson.....	7,000	3,150	170*	rolled-c.	semi-flx..	solid....	36x5	40x5d	cast-d...	3	4-4⅜x5½	36.15	pairs....	opp....	cent...	cell-cast...	doub..	Bosch*....	hand....
Zeitler & Lamson.....	10,000	4,150	180*	rolled-c.	semi-flx..	solid....	36x6	40x6d	cast-d...	3	4-5 1/16x5½	41.62	pairs....	opp....	cent...	cell-cast...	doub..	Bosch*....	hand....

Received Too Late to Classify

Clyde.....C	3,000	1,000	134	pr-steel..	.....	solid*...	34x3¼*	34x2½d*	wood-sq.	3	4-3¾x4¼	22.50	block...	left....	thermo.	fin-cast....	sing..	Eisemann.	fixed...
Dayton.....H	4,000	2,650	.....	rolled-c.	.....	solid....	36x4	36x3½d	wood-ov.	3	4-4¼x5	29.00	pairs....	opp....	gear...	sq-t-cast...	dual..	Bosch.....	hand....
Dayton.....	7,000	3,400	.....	rolled-c.	.....	solid....	36x5	36x4d	wood-ov.	4	4-4¼x6	29.00	block...	left....	cent...	fin-cast....	dual..	Bosch.....	hand....
Dayton.....K	7,000	3,400	.....	rolled-c.	.....	solid....	36x5	36x4d	wood-ov.	3	4-4½x5½	36.15	pairs....	opp....	gear...	sq-t-cast...	dual..	Bosch.....	hand....
Dayton.....M	10,000	4,500	.....	rolled-c.	.....	solid....	36x6	42x5d	wood-ov.	3	4-5½x7	44.20	pairs....	opp....	cent...	sq-t-cast...	dual..	Bosch.....	hand....
Dayton.....E	15,000	4,950	.....	rolled-c.	.....	solid....	36x7	42x6d	wood-ov.	3	4-5½x7	44.20	pairs....	opp....	cent...	sq-t-cast...	dual..	Bosch.....	hand....
Denmo.....10	2,500	1,385	124	pr-steel..	rigid....	p&s*...	34x4½*	34x4	wood-sq.	3	4-3¾x5	22.50	block...	.....	thermo.	cell-sheet..	sing..	Dixie.....	.....
Diamond-T.....J5	2,000	1,485	132	pr-steel..	.....	solid....	36x3	36x4	wood-ov.	.....	4-3¼x5	19.61	block...	right...	thermo.	z-z-t-sheet.	sing...	Bosch.....	fixed....
Diamond-T.....J4	3,000	2,050	154*	pr-steel..	.....	solid....	36x3½	36x5	wood-ov.	.....	4-3¾x5	22.50	block...	right...	cent...	z-z-t-sheet.	sing...	Bosch.....	fixed....
Diamond-T.....J3	4,000	2,200	154*	pr-steel..	.....	solid....	36x4	36x6	wood-ov.	3	4-4 1/16x5½	27.20	block...	right...	cent...	z-z-t-sheet.	sing...	Bosch.....	fixed....
Diamond-T.....L	7,000	3,300	170*	pr-steel..	.....	solid....	36x5	38x5d	wood-ov.	.....	4-4½x5½	32.40	pairs....	opp....	cent...	z-z-t-sheet.	sing...	Bosch.....	hand....
Diamond-T.....R	10,000	4,200	170*	pr-steel..	.....	solid....	36x6	40x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	opp....	cent...	z-z-t-sheet.	sing...	Bosch.....	hand....
Duplex.....D	6,000	.....	130*	pr-steel..	flexible..	solid....	36x6	36x6	wood-sq*	3	4-4½x5	32.40	block...	right...	cent...	fin-sheet...	sing...	Eisemann*	hand....
Geneva.....1	1,500	.....	96	.....	.....	solid....	34x2	36x2½	.....	2	2-5¼x4¼	22.10	sing....	head...	gear...	fin-sheet...	sing...	Simms....	fixed....
Stegeman.....	3,000	1,900	150	pr-steel..	flexible..	solid....	34x3½	36x5	wood-sq.	.....	6-3¼x4½	25.39	block...	left....	cent...	sq-t-sheet..	sing...	Westghs...	auto....
Stegeman.....	5,000	2,500	144*	pr-steel..	flexible..	solid....	34x4	36x4d	wood-sq.	.....	6-3½x5½	29.45	block...	left....	cent...	fin-cast....	sing...	Westghs...	auto....
Stegeman.....	7,000	3,000	156	pr-steel..	flexible..	solid....	36x4	40x5d	wood-sq.	.....	6-3½x5½	33.75	pairs....	left....	cent...	fin-cast....	sing...	Westghs...	auto....
Stegeman.....	10,000	4,000	170	pr-steel..	flexible..	solid....	36x5	40x6d	wood-sq.	.....	6-3½x5½	33.75	pairs....	left....	cent...	fin-cast....	sing...	Westghs...	auto....
Vim.....20	1,000	635	102	pr-steel..	.....	pneu....	31x4	31x4	.....	3	4-3x4½	14.40	block...	right...	thermo.	fin-sheet...	sing...	Dixie.....	hand....

Steam Vehicles

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME Material	FRAME Construction	TIRES Kind	TIRES SIZES IN INCHES Front	TIRES SIZES IN INCHES Rear	Wheels	BOILER Location	BOILER Type	BOILER Heating Surface in Sq. In.	BOILER Horsepower	BOILER BURNER Type	BOILER BURNER Regulation	BOILER PRESSURE Normal in Lbs.	BOILER PRESSURE Maximum in Lbs.	WATER Water Capacity in Gal.	WATER CONDENSER Type	WATER CONDENSER Circulation
Stanley.....	1,500	1,550	134	pr-steel..	semi-flx..	pneu....	34x4½	34x4½	wood-ov.	under hood	fire-tube.	14,976	20	Bunsen.	pressure.	575	625	24	cell-sheet	natural
Stanley.....	2,500	2,000	136	pr-steel..	semi-flx..	pneu....	36x5	36x5	wood-ov.	under hood	fire-tube.	22,752	30	Bunsen.	pressure.	575	625	50	cell-sheet	natural

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* **Radiator Core,** cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single:* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR											TRANSMISSION								BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM				GEARSET											
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	Name and Model
none			cent	motor	own	1,050	15	H & N	grav	seat	cone	selec	unit-m	4	8.50–1	ext-g-4	springs	springs	ext-sht	ext-r-w	left	cent	Walter C
none			cent	motor	own	1,000	15	H & N	grav	seat	cone	selec	unit-m	4	7.85–1	ext-g	springs	springs	ext-sht	int-r-w	left	cent	Walter B
			cent	motor	Pierce	1,100	11	Zenith	grav	seat	dry-d	selec	unit-m	4	10.30–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Watson Tractor
s&l		extra			none			own	grav	seat	wet-p	selec	amid	4		bevel	rad-rd	springs	int-r-w	ext-r-w	left	c & l	White GBBE
s&l		extra			none			own	grav	seat	wet-p	selec	amid	4		db-red	rad-rd	springs	int-r-w	ext-r-w	left	c & l	White TBC
					none			own	grav	seat	wet-p	selec	amid	4		dbl chn	rad-rd		int-r-w	ext-j-s	left	c & l	White TAD
					none			own	grav	seat	wet-p	selec	amid	4		dbl chn	rad-rd		int-r-w	ext-j-s	left	c & l	White TCD
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	unit-j	3	7.32–1	dbl chn	rad-rd		int-r-w	int-sht	right	cent	Wichita A
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	amid	3	7.80–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita K
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	amid	3	8.66–1	worm-r	springs	springs	ext-r-w	int-r-w	right	cent	Wichita L
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	unit-j	3	8.24–1	dbl chn	rad-rd		int-r-w	int-sht	right	cent	Wichita B
s&l-2	Westghs	125.00	cent	motor	Wauk'a	1,060	13	Stmbg	grav	seat	cone	selec	amid	3	8.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita R
s&l-2	Westghs	150.00	cent	motor	Wauk'a	1,200	11	Stmbg	grav	seat	cone	selec	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita O
s&l-2	Westghs	150.00	cent	motor	Wauk'a	940	9	Stmbg	grav	seat	cone	selec	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita Q
lighting		stock	cent	motor	Pierce	1,200	18	Ray*	grav	seat	dry-d	selec	unit-m	3	6.50–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox S
lighting		stock	cent	motor	Pierce	1,100	16	Ray*	grav	seat	cone	selec	amid	3	7.70–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox R
lighting		stock	cent	motor	Pierce	1,100	14	Ray*	grav	seat	cone	selec	amid	3	8.60–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox Q
lighting		stock	cent	motor	Pierce	1,100	10	Ray*	grav	seat	cone	selec	amid	3	11.70–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox P
			cent	motor	Pierce	1,050	15	Marvel	grav	seat	cone	selec	amid	3	8.60–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilson E
			cent	motor	Pierce			Zenith	grav	seat	dry-d	selec	unit-m	3		worm	springs	springs	int-r-w	int-r-w	left	cent	Witt Will WD16
			cent	motor	Pierce			Zenith	grav	seat	dry-d	selec	unit-m	3		worm	springs	springs	int-r-w	int-r-w	left	cent	Witt Will WD16
			cent	motor	Wauk'a	1,200	15	Master	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wisconsin B
			cent	motor	Wauk'a	1,100	14	Master	grav	seat	dry-d	selec	unit-m	3	8.75–1	worm	springs	springs	int	int	left	cent	Wisconsin C
								Zenith	grav	seat	wet-d		unit-m	3		worm-4	springs	springs	int	int	left	cent	W. S 4
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	16	Stmbg	vac	seat	dry-p	ind-c	unit-m	3	7.75–1	worm	springs	springs	int-r-w	ext-r-w	left	cent	Zeitler & Lamson
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	14	Stmbg	vac	seat	dry-p	ind-c	unit-m	3	8.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Zeitler & Lamson
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	12	Stmbg	vac	seat	dry-p	ind-c	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Zeitler & Lamson
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	10	Stmbg	vac	seat	dry-p	ind-c	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Zeitler & Lamson

Received Too Late to Classify

									grav	dash	wet-p	selec	unit-m	3		int-gear	springs	springs	int-r.w	ext-r-w	left	cent	Clyde C
								Stmbg	grav	seat	wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton H
								Stmbg	grav		dry-p	selec	amid	3		worm	rad-rd	t-arm	int-r-w	int-r-w	left	cent	Dayton
								Stmbg	grav	seat	wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton K
								Stmbg	grav		wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton M
								Stmbg	grav		wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton E
s&l-2	Spl-App	stock	cent	d-shaft	Pierce		20	Stewart	grav	seat	dry-p	selec	unit-m	3		int-g	springs	springs	ext-r-w	int-r-w	left	cent	Denmo 10
						1,300	18	Ray	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Diamond-T J5
						1,250	16	Ray	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Diamond-T J4
			cent	motor	Pierce	1,100	15	Ray	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Diamond-T J3
			suct	motor	Mon'rch	775	12	Ray	grav	seat	dry-d	selec	unit-m	4	6.88–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Diamond-T L
			suct	motor	Mon'rch			Ray	grav		dry-d	selec	amid	4	13.66–1	worm	rad-rd	springs	int	int	right	cent	Diamond-T R
s,l&i		150.00	cent	duplex	Duplex	940	12	Scheb	vac		dry-d	selec	unit-m	6	12.00–1	int-g-4	rad-rd	t-arm	ext-sht	ext-sht	left	cent	Duplex D
							18	Scheb			dry-p	plan	unit-j	2		dbl chn	rad-rd				right	right	Geneva 1
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	18	Stmbg	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	9.25–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	12	Stmbg	grav	seat	dry-d	selec	unit-m	3	10.33–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	10	Stmbg	grav	seat	dry-d	selec	unit-m	3	11.00–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
							25	Zenith			cone	selec	unit-m	3	4.50–1	bevel	springs	springs			left		Vim 20

Steam Vehicles

SYSTEM		ENGINE							TRANSMISSION					CONTROL					
Feed Pump Type	Feed Control	Location	No. of Cylinders	Cylinders Cast	Valve Location	Valve Action	Valve Stroke	Reverses By	Final Drive	Gear-Ratio	Axle Type	Propulsion Taken By	Torque Taken By	Throttle	Hook-up	Reverse	Steering Wheel Location	Brake Lever Location	Name and Model
plunger	by-pass	unit-x	2	block	btw cyls	Stephenson	adj	links	spur-g	2 1/12–1	non-fl	rad-rd	t-arm	lever	pedal	pedal	left	left	Stanley
plunger	by-pass	unit-x	2	block	btw cyls	Stephenson	adj	links	spur-g	2–1	non-fl	rad-rd	t-arm	lever	pedal	pedal	left	left	Stanley

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; snet, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of 37 Electric The American Market

Name and Model	Load Capacity in Pounds	PRICE OF CHASSIS: With Battery	PRICE OF CHASSIS: Without Battery	Wheelbase in Inches	TIRES: Kind	TIRES: SIZES IN INCHES: Front	TIRES: SIZES IN INCHES: Rear	BATTERY: Location	BATTERY: Make and Type	BATTERY: No. Plates	BATTERY: No. Cells	BATTERY: No. Trays	BATTERY: Amp.-Hr. Capacity	BATTERY: MILES PER CHARGE: Light	BATTERY: MILES PER CHARGE: Loaded	MOTOR: Location and Number	MOTOR: Make
Atlantic 1-C	2,000			103	solid	34x3½	36x4	amid-u	optional							amid-1	G.E.
Atlantic 2-C	4,000			115½	solid	34x4	36x3d	amid-u	optional							amid-1	G.E.
Atlantic 3-C	7,000			135	solid	36x5	40x4d	amid-u	optional							amid-1	G.E.
Atlantic 5-C	10,000			144	solid	36x6	40x5d	amid-u	optional							amid-1	G.E.
C.T	1,000	1,925*	1,500	90	solid	36x3	36x3	amid-u	Philadelphia*	13*	42*		153*		60*†	unit-x-2	G.E.
C.T	2,000	2,330*	1,800	100	solid	36x3½	36x4	amid-u	Philadelphia*	17*	42*	5*	204*		60*†	unit-x-2	G.E.
C.T	4,000	2,850*	2,200	116	solid	36x5	36x3½d	amid-u	Philadelphia*	21*	42*	6*	225*		60*†	unit-x-2	G.E.
C.T	7,000	3,910*	3,100	115	solid	36x3½d	36x4d	amid-u	Philadelphia*	27*	42*	6*	331*		50*†	unit-x-4	G.E.
C.T	10,000	4,425*	3,500	132	solid	36x4d	36x5d	amid-u	Philadelphia*	31*	42*	9*	382*		50*†	unit-x-4	G.E.
Couple-Gear H	7,000	4,200	3,500	96*	solid	36x4d	36x4d	amid-u	U.S.L.*	23*	44*	6*	280*	40*	30*	in wheel-4	C-G
Couple-Gear AF	10,000	3,900	3,100	100*	s & st	36x5d	64x5½	amid-u	U.S.L.*	27*	44*	6*	330*	35*	25*	in wheel-2	C-G
Couple-Gear A	10,000	4,650	3,900	96*	solid	36x5d	36x5d	amid-u	U.S.L.*	27*	44*	6*	330*	40*	30*	in wheel-4	C-G
Couple-Gear SD	14,000	5,250	4,400	96*	solid	36x6d	36x6d	amid-u	U.S.L.*	33*	44*	6*	400*	40*	30*	in wheel-4	C-G
G.V	1,000			89	solid	36x2½	36x2½	amid-u	Exide-Ir*	9*	44*	4*	133*		45*†	in rear-1	G.E.
G.V	2,000			104	solid	36x3½	36x3½	amid-u	Exide-Ir*	11*	44*	5*	169*		45*†	in rear-1	G.E.
G.V	4,000			112½*	solid	36x4	36x3d	amid-u	Exide-Ir*	15*	44*	6*	227*		45*†	in rear-1	G.E.
G.V	7,000			132½*	solid	36x6	36x4d	amid-u	Exide-Ir*	17*	44*	6*	268*		40*†	in rear-1	G.E.
G.V	10,000			141½*	solid	36x7	36x5d	amid-u	Exide-Ir*	19*	44	6*	298*		35*†	in rear-1	G.E.
Lansden S	750	1,850	1,175	90	cush	34x3	34x4	u-seat	Edison-A4		60	10			60	unit-x-1	G.E.
Lansden M	1,000	2,310	1,500	90	solid	36x2½	36x3	amid-u	Edison-A4		60	10			60	unit-j-1	G.E.
Lansden M	2,000	2,900	1,700	106	solid	36x3	36x3½	amid-u	Edison-A6		60	10			60	unit-j-1	G.E.
Lansden M	4,000	3,660	2,100	120	solid	36x4	36x3d	amid-u	Edison-A8		60	10			50	unit-j-1	G.E.
Lansden M	7,000	4,455	2,475	130	solid	36x5	36x4d	amid-u	Edison-A10		60	10			50	unit-j-1	G.E.
Lansden M	10,000	5,190	2,850	142	solid	36x6	36x5d		Edison-A12		60	10			50	unit-j-1	G.E.
Lansden Tractor	20,000	3,660	2,100	58	solid	30x4	30x5	amid-o	Edison-A8		60	10			60	rear-1	G.E.
Walker M	1,000			90*	solid	34x3	36x3½	amid-u	Edison*		60*				75*	unit-x-1	West.
Walker K	2,000			92*	solid	34x3	36x4	amid-u	Edison*		60*				75*	unit-x-1	West.
Walker L	4,000			107*	solid	38x4	38x6	amid-u	Edison*		60*				65*	unit-x-1	West.
Walker D	6,000			126*	solid	36x5	38x4d	amid-u	Edison*		60*				60*	unit-x-1	West.
Walker E	8,000			130*	solid	36x6	38x5d	amid-u	Edison*		60*				60*	unit-x-1	West.
Walker N	10,000			136*	solid	36x7	38x6d	amid-o	Edison*		60*				50*	unit-x-1	West.
Ward WS	750	760		88	solid	32x2½	32x2½	u-seat	Ward*		42*	3*	100*		35*	amid-1	West.
Ward EO	1,000	1,250		90	solid	32x2½	34x6	amid-u	Ward*		42*	3*	127*		45*	amid-1	West.
Ward EA	2,000	1,500		99	solid	34x3	36x4	amid-u	Ward*		42*	3*	153*		40*	amid-1	West.
Ward EB	4,000	1,900		111	solid	36x4	38x6	amid-u	Ward*		42*	3*	204*		35*	amid-1	West.
Ward EC	7,000	2,450		132	solid	38x6	40x3½d	amid-u	Ward*		42*	3*	280*		30*	amid-1	West.
Ward ED	10,000	2,950		152	solid	40x3½d	42x5d	amid-u	Ward*		42*	3*	357*		25*	amid-1	West.

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** cush, *cushion;* s & st, *solid in front and steel in rear.* **Tire Sizes,** d, *dual.* **Battery Location** amid-u, *amidships, underslung below frame;* front-o, *at front, over frame;* amid-o, *amidships over frame;* rear-o, *at rear, over frame;* u-hood, *under hood;* u-hood-r, under *hood in rear;* front-u, *in front, under frame;* u-seat, *under seat;* **Battery Make and Type,** Exide-Ir, *Exide-Ironclad type.* **Miles per Charge, Loaded,** †, *half way light, half loaded.* **Motor, Location and Number,** amid, *amidships;* unit-j, *unit with jackshaft;* unit-x, *unit with axle.* Numbers following *refer to number of motors in chassis.*

WITH the thought in mind that the fields of the gasoline and electric commercial vehicle differ to so great an extent that inclusion in one list might prove confusing if the reader sought to compare different makes of either electric or gasoline motor trucks, the electric has been segregated from the latter and above is offered a tabulation showing the specifications of thirty-seven models of the electric type, made by seven manufacturers.

In this list is given details of chassis, price, wheelbase, battery data that includes the number of plates and cells per battery, the arrangement in trays and the ampere hour capacity. The mileage per charge is given that ready comparison may be made. Motor data covers the location, make and winding as well as the horsepower and voltage, together with the speed, both loaded and light.

The location of control and the number of speeds, gear-reductions, first, final and total, as well as the final drive is covered. In fact, every point upon which question might arise in the minds of the user or dealer is more or less fully covered. At the bottom of tabulations on these two pages is given a glossary of the terms used in the tables, which explains the abbreviations.

The different cars are grouped and arranged so that each make occupies a separate group and each model a separate line. Occasionally there will be found a blank, which is accounted for by the fact that the manufacturer failed to furnish Motor Age with official information covering that particular point of his product.

While the electric truck is more especially a vehicle for city use, its utility has been rolling up until it now occupies a prominent place in a specialized field. Where current is available for charging, the electrically-driven car has forged ahead rapidly in the last year or two.

The segregation of this particular line will give dealers an opportunity to study and compare the various makes and models as well as give the users, prospective or otherwise, an authentic source of information.

The details given are fairly comprehensive, covering, in addition to the points already mentioned, the method of propulsion, the type of springs, etc.

These pages should be preserved for future reference and will prove of material advantage during the coming year.

Not only is it desirable for the truck user to have at his fingers' ends the engineering data he naturally desires when adding to his line of motor-driven equipment, but it is always well to use discretion in buying, this applying to the purchase of trucks as well as of any other commodity used in every-day practice. The truck user will find it much more economical to get a truck that fits his requirement than to have to fit his requirements to the truck and the following data is to guide him in making a choice.

The load capacity of a motor truck is the maximum amount of load it is intended to carry in regular service, in addi-

Commercial Vehicle Chassis Listed on for the 1917 Season

MOTOR					CONTROLLER			DRIVE						SPRINGS		CONTROL		
Winding	Horse-power	Voltage	SPEED IN MILES PER HOUR		Location	SPEEDS		GEARING		Total Gear-Ratio	Torque Taken By	Propulsion Taken By		Front	Rear	Steer	Controller Lever	Name and Model
			Light	Loaded		Ahead	Reverse	First Reduction	Final Reduction									
series	2.6	85*	12	10	u-seat	4	2	s-chain	dbl chn	10.82–1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 1-C
series	2.6	85*	11	9	u-seat	4	2	s-hcain	dbl chn	10.82–1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 2-C
series	3.9	85*	10	8	u-seat	4	2	s-chain	dbl chn	9.95–1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 3-C
series	6.0	85*	9	7	u-seat	4	2	s-chain	dbl chn	13.48–1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 5-C
series	2.5	85*	15	13½	st-col	4	2	spur-gear	spur-gear	10.00–1	rad-rd	rad-rd		¾-ell	½-ell	wheel-l	u-wheel	C.T
series	3.2	85*	14	12	st-col	4	2	spur-gear	spur-gear	11.50–1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	5.0	85*	12	10	st-col	4	2	spur-gear	spur-gear	12.14–1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	7.0	85*	11	9	st-col	4	2	spur-gear	spur-gear	17.32–1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	7.0	85*	9	7	st-col	4	2	spur-gear	spur-gear	20.14–1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	12	88	12	9	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear H
series	10	88	9	7	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear AF
series	12	88	10	8	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear A
series	20	88	10	8	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear SD
series	2.5	85*	13½	12	u-seat	5	2	s-chain	dbl chn	10.2–1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	3.4	85*	11½	10	u-seat	5	2	s-chain	dbl chn	10.76–1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	4.6	85*	10½	9	u-seat	5	2	s-chain	dbl chn	11.61–1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	5.6	85*	9½	8	u-seat	5	2	s-chain	dbl chn	13.95–1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	6.8	85*	8½	7	u-seat	5	2	s-chain	dbl chn	13.95–1	spriigs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series		60		15	u-hood	4	2	spur-gear	bevel	12.00–1	t-arm	springs		½-ell	½-ell	wheel-l	u-wheel	Lansden S
series		60		12	u-hood	4	2	bevel	dbl chn	8.00–1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		10	u-hood	4	2	bevel	dbl chn	10.00–1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		9	u-hood	4	2	bevel	dbl chn	13.00–1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		7	u-hood	4	2	bevel	dbl chn	13.00–1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
		60		6	u-hood	4	2	bevel	dbl chn	14.50–1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60	8	5	u-seat	4	2	s-chain	dbl chn	9.00–1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden Tractor
series	3.0	60*	17	15	u-seat	5	5	direct	plan	16.87–1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker M
series	3.5	60*	16	14	u-seat	5	5	direct	plan	16.87–1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker K
series	4.0	60*	16	14	u-seat	5	5	direct	plan	16.14–1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker L
series	5.0	60*	13	12	u-seat	5	5	direct	plan	15.57–1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker D
series	6.0	60*	12	11	u-seat	5	5	direct	plan	15.57–1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker E
series	6.5	60*	12	10	u-seat	5	5	direct	plan	18.83–1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker N
series	2					4		direct	sp-bev					½-ell	½-ell	wheel-l	u-wheel	Ward WS
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EO
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EA
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EB
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EC
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward ED

ABBREVIATIONS: (continued). **Controller, Location,** u-seat, *under seat:* st-col, *on steering column:* u-plat, *under platform:* u-hood, *under hood:* btw seats, *between seats.* **Drive, Gearing, First Reduction,s,** chain, *silent chain.* **Final Reduction,** dbl chn, *double chain*; sp-bev, *spiral bevel gears*; plan, *planetary gears*; -f, *to front wheels*; -4, *to all four wheels.* **Torque Taken By,** t-arm; *torque arm*; sub-f, *sub-frame*; pdstl, *pedestal:* rad-rd, *radius rods.* **Propulsion Taken By,** rad-rd, *radius rods:* sub-f, *sub-frame*; pdstl, *pedestal.* **Springs,** ¼-ell, *one-quarter elliptic*; ½-ell, *half-elliptic*; ¾-ell, *three-quarters-elliptic*; trans-x-*transverse X shape or reversed elliptic.* **Control, Steer** -l, *to the left*; -r, *to the right:* -c, *in the center.* **Controller Lever,** u-wheel, *under steering wheel*; l-seat, *to left of seat*; r-seat, *to right of seat:* btw seats, *between seats,* cent, *center*; l-plat, *to left of platform.*

tion to the weight of the body, the cab and the crew. The term does not consider the weight of the unloaded vehicle, but only the load it can carry.

The chassis price is the list price of the chassis, equipped with a standard seat or cab and all other standard equipment except the body, which is usually either selected from a stock of standard bodies or built to order, being charged for extra. Some makers, however, do not sell chassis not equipped with bodies, as indicated in the table by a small "c" following the price, representing that the price is for the complete vehicle.

Some chassis are not listed with their batteries, as such a wide range of option is given the purchaser on battery equipment that the chassis and the battery are each priced separately. Different batteries sell at widely differing prices, according to make and also according to type and capacity of the same make. Therefore, this year the same as last, a separate column has been provided for the price without the battery.

NEW CAR FOR PONTIAC

Detroit, Mich., Oct. 30—R. A. Palmer, organizer and director of business policies of the Cartercar company, from 1905 to February 1, 1912, has organized the Olympian Motors Co., at Pontiac, Mich. Mr. Palmer has associated with himself as executives, Glenn C. Bull, who will be treasurer of the company; C. E. Callender, secretary; and A. Manford Stryker, advertising manager. The Olympian company will build a car to list at less than $1,000.

LENOX TO MAKE TRACTORS

High Park, Mass., Oct. 30—Two tractors, one selling for $4,500 and the other for $2,000, are being produced by the Lenox Motor Car Co. They will be known as the Lenox American tractor, and they will not interfere in any way with the building of motor cars by this company.

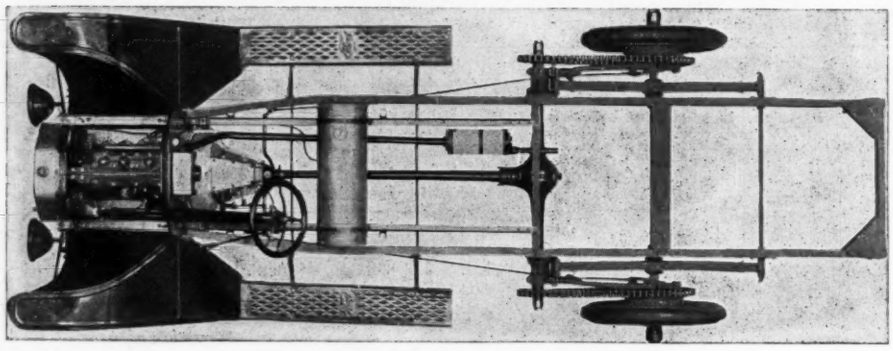
The Lexox American large tractor weighs 12,500 pounds. Among the features of these tractors are four-wheel drive and steer, self starters, three speed gearset and patented worm and sleeve clutch. The company plans to build about 300 tractors the first season.

CAR COMMISSION PIRATE THRIVES

Los Angeles, Cal., Oct. 30—A new type of motor car commission pirate has been detected here. He advertises he can supply certain cars at an interesting discount. When the prospect calls, he ascertains the name and address and the kind of car preferred. Then with this information he visits the agencies and seeks to peddle the prospect among salesmen demanding a split in commission. Of course, he has no way of obtaining a discount and reports to the prospect inability to get the car just at this time. But he has loosed a pack of bona fide salesmen on the prospect and if any of them lands him, Mr. Grafter gets his share.

Adapting Ford Chassis for Truck Work

Units for Conversion a New Industry—Beginning to Develop for Other Cars



The Smith Form-A-Truck, a chain-driven type

AN offshoot of the purely truck-building industry that is rapidly gaining importance in its field is the conversion of passenger cars into light commercial vehicles through special apparatus. At the present time this conversion is applied almost wholly to Ford cars, but in some installations it is extended to other cars of large production.

The Ford chassis as it is turned out by the factory is designed to carry a nominal load of 800 pounds, but at the present time there are between 35 and 40 concerns turning out attachments for the purpose of increasing the carrying capacity of the Ford to 1 ton or over. The designs of most of these also contemplate such changes in the drive and suspension as will make the Ford chassis more applicable to commercial use under the heavier load. Thus it is possible to produce a 1-ton truck at a lower price than it is possible to purchase any of the conventional 1-ton trucks.

Usually Increase Wheelbase

With perhaps two exceptions, all of these Ford adapters have the common characteristic that the wheelbase of the Ford chassis is increased to permit a longer body. However, the details of construction and the manner in which power is transmitted to the rear wheels differs considerably among the various types.

The adapting systems on the market now for Fords can be classified in five main groups, according to the portions of the Ford rear end assembly and frame retained in the chassis after its conversion.

In the first class are those attachments in which the regular Ford frame is extended by cutting it near its center and an additional section of frame fitted, the stock axle and spring being used by lengthening the propellor shaft. In some designs the Ford frame is not cut but a new frame section is attached to its rear end and the stock axle moved back and the shaft lengthened.

The Utility, a chain-driven adapter

Ford Chassis Adapters

Ames Motor Car Co., Owensboro, Ky.—Ames-ton.
Automobile Mfg. & Eng. Co., Detroit, Mich.—Evans.
Chain-Ton-Ford Co., Philadelphia, Pa.
Commercial Truckmobile Co., Chicago, Ill.
Dearborn Motor Truck Co., Chicago, Ill.
Detroit Truck Co., Detroit, Mich.—Tonford.
Walter J. Forbes, Boston, Mass.—Forbes.
Franklin 2-Way Converter Co., Chicago, Ill.
Greb Co., Boston, Mass.
Hayes Diefenderfer Co., New York, N. Y.—H-D.
Hudford Co., Philadelphia, Pa.—Hudford.
Iowa Motor Truck Co., Ottumwa, Ia.—Iowa.
Jewett Car Co., Newark, O.
Kelly Convertible Auto Truck Co., Chicago, Ill.
Lakeside Motor Truck Co., Chicago, Ill.
Mak-A-Truck Co., Chicago, Ill.
Maremont Mfg. Co., Chicago, Ill.—Camelford.
Maxfer Truck & Tractor Co., Chicago, Ill.—Maxfer.
Motor-Accessory Distributing Co., Boston, Mass.—Longford.
No-Chain Truck Unit Co., St. Louis, Mo.
Rayford Co., Philadelphia, Pa.—Rayford.
Redden Motor Truck Co., New York, N. Y.—Redden Truck Maker.
Robinson Machine Co., Detroit, Mich.—Truckford.
Rothweiler & Co., Seattle, Wash.
Scott Machine Works, Seattle, Wash.
Smith-Form-A-Truck Co., Chicago, Ill.—Form-A-Truck.
Staude Mfg. Co., E. G., St. Paul, Minn.—Mak-A-Tractor.
Stewart Mfg. Co., Waterloo, Ia.—Uni-Truck.
Swedish Crucible Steel Co., Detroit, Mich.—Olson.
Ton-A-Ford Truck Co., Racine, Wis.
Truck Attachment Co., Seattle, Wash.—Wright.
Union Truck Mfg. Co., New York, N. Y.—Union.
Utility Motor Truck Co., Chicago, Ill.—Utility.
Woodward Truck Attachment Co., Los Angeles, Cal.—Ton-Ford.
Xtend-A-Ford Co., Philadelphia, Pa.

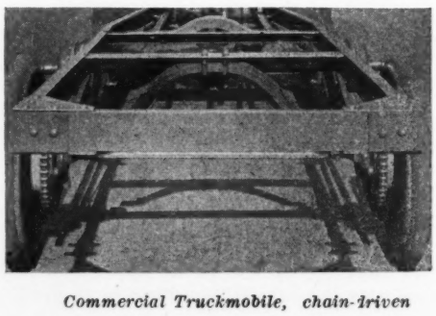
The second class, and the simplest is that in which the wheelbase of the Ford chassis is not increased, and the original axle is used with steel wheels whose housings are carried on roller bearings independently of the axle. Attached to the body are supplementary side springs which transfer the additional load to brackets on the wheel housings.

Chain-Drive Foremost

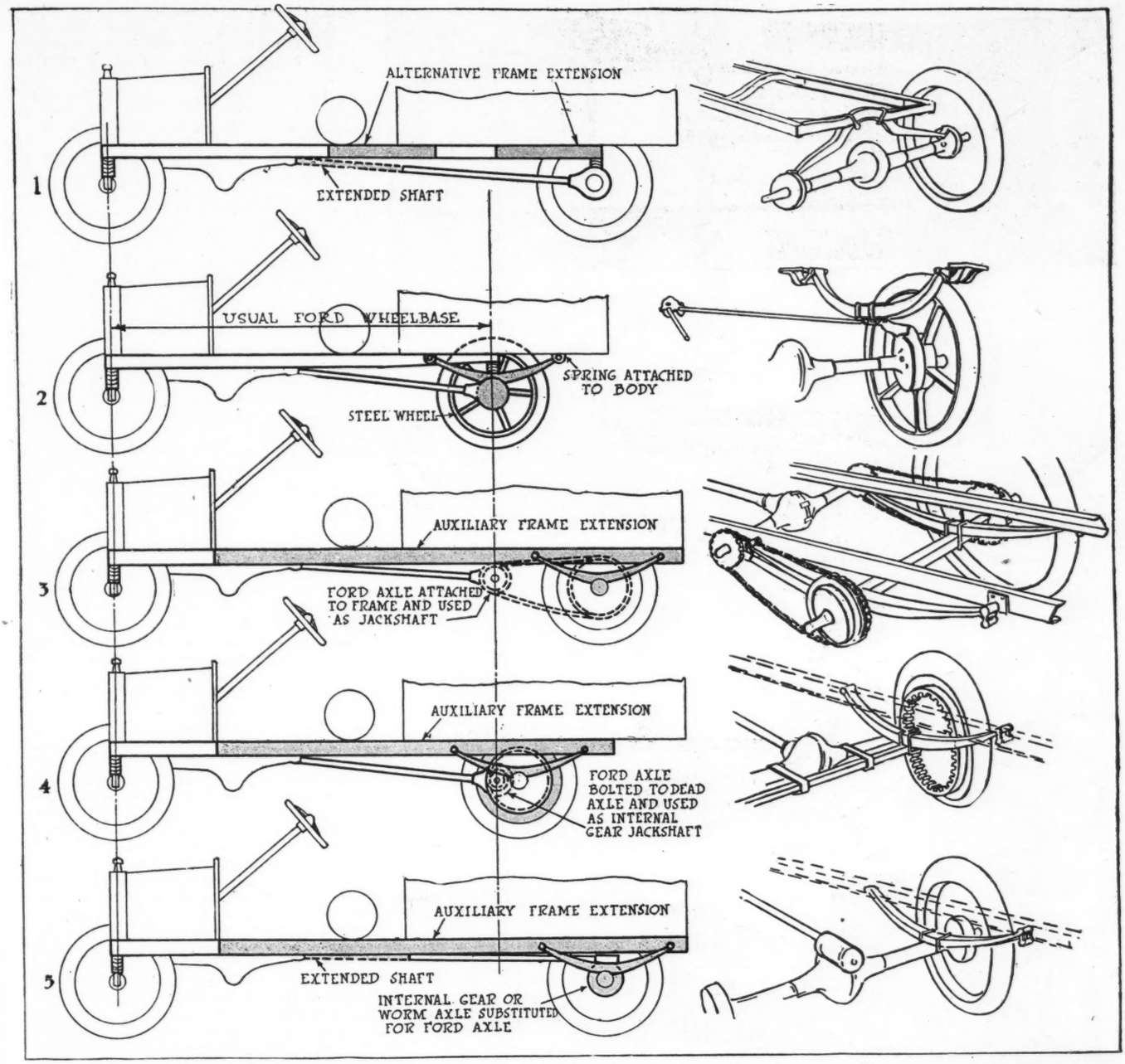
The third class comprised a telescoping or overlapping frame which carries at its rear end a chain-driven truck axle assembly. The stock axle is used as a jackshaft by fitting driving sprockets instead of the stock wheels.

The fourth class consists of those designs in which the stock axle is used as a jackshaft of an internal gear drive, the load-carrying axle, suspension rear wheels and frame extension being attached as a unit. The stock wheels are removed and fitted with pinions which mesh with large internal gears fitted to the solid tire truck wheels.

In the fifth class, the entire Ford rear axle is replaced by a complete truck axle



Commercial Truckmobile, chain-driven



The five general types of Ford adapters, classified according to what parts of the Ford are retained in the converted vehicle, shown in elementary side and perspective sketches to indicate the changes made. The shaded portions indicate those parts which are added. Note that the Ford wheelbase is increased in all five classes except the second. In No. 1 the Ford rear axle and spring are retained. The wheelbase is increased by the introduction of a frame section either at some point near the center or at the extreme rear. An additional piece of driveshaft of the same length as the increase in the Ford wheelbase is used to transmit the power to the rear axle. In No. 2 the additional load capacity is taken care of through the use of steel wheels with housings carried on roller bearings independent of the Ford axle, which is used intact. Supplementary side springs attached to the body are employed. In No. 3 the Ford axle is used as a jackshaft for a chain-driven rear-end truck assembly in unit with a frame extension. In No. 4 the Ford axle is employed as a jackshaft for an internal-gear axle unit. In No. 5 the entire Ford rear end is replaced by a truck frame addition and axle which may be driven either by worm or internal gears

assembly with some form of telescoping frame. In this class the final drive is either by worm or internal gears.

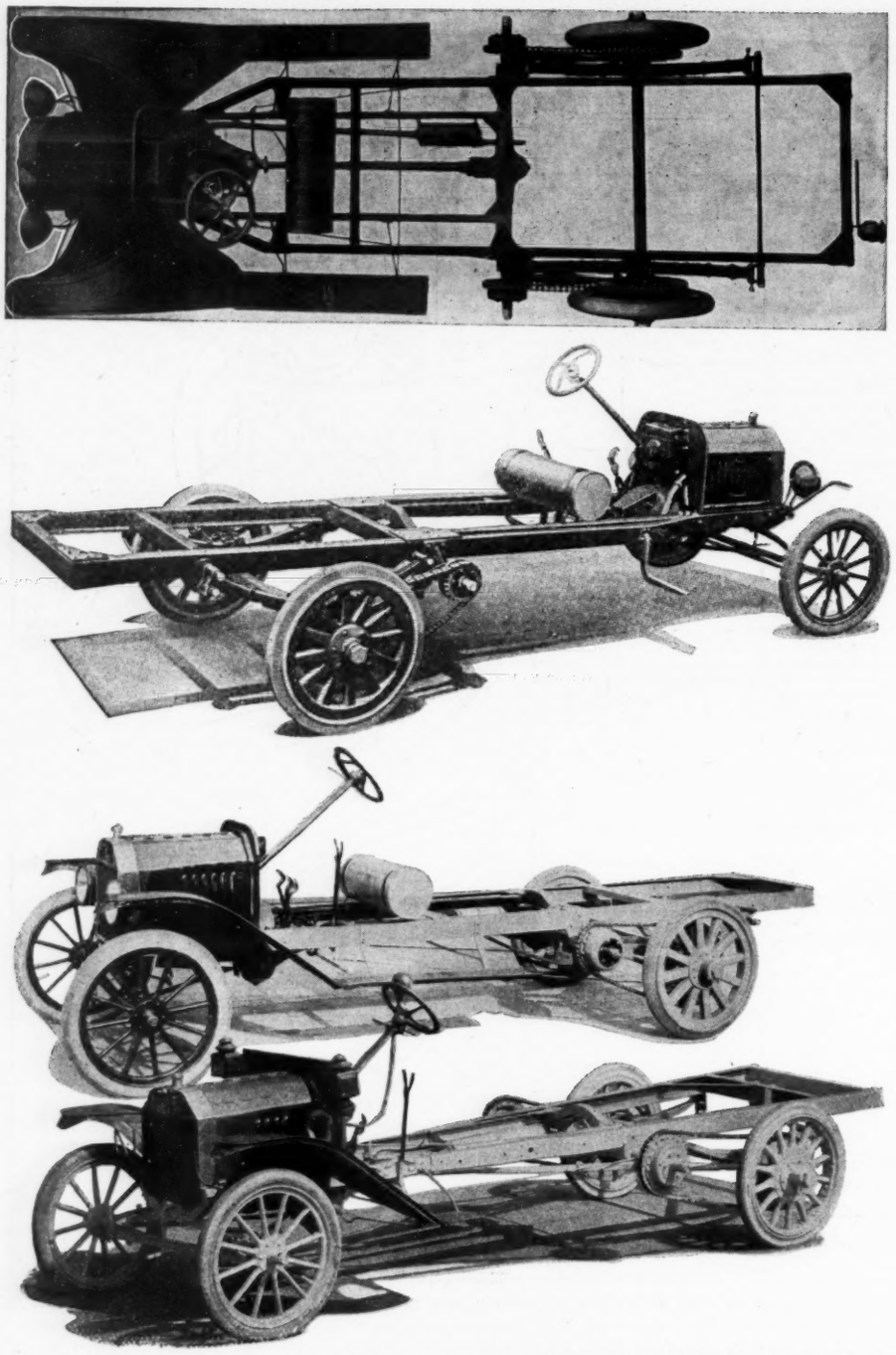
In the first class of adapters, in which the Ford rear axle and wheels are used intact in the converted vehicle, the additional load-carrying capacity of the latter is usually provided for by the introduction of additional leaves in the rear spring, a truss rod for the axle housing and the fitting of strengthening cross-members in the added frame section or in the Ford frame itself.

Aside from the mechanical construction of the five types, those of the various makes which use clamps or bolts instead of rivets for the attachment of the adapter may be removed from the Ford in a relatively short time, provided the discarded Ford parts in each particular case are not disposed of. Likewise, those which use some form of clamps for attachment and some of those which use rivets may be fitted to the Ford chassis in less than 1 day.

Most of the adapter makers supply only the adapter parts, leaving it to the purchaser to have he Ford converted under his own supervision and to dispose of the Ford parts eliminated, although at least one maker will furnish the complete adapted vehicle.

Frame Extensions

Forbes—Walter J. Forbes, Boston, Mass.—The Forbes commercial converter comprises patches which are placed at about the middle of the Ford frame, the joints being of the lap type, securely riveted and swedged to a tight fit. The rear assembly is not



Chain-driven adapters—Reading from the top down, Truckford, Tonford, Maxfer and Evans

affected, except that an extra length of shafting is provided and also an extension torsion tube which is rigidly fastened to the Ford torsion tube at its front end and anchored by a globe joint to the yoked cross member. Running boards are extended and braced. One extra leaf is inserted in the rear spring. Wheelbase, 136 inches; gear ratio, 3.63 to 1; price, $1[illegible]0.

H-D—Hayes-Diefenderfer Co., New York—This simple attachment fastens to the rear end of the regular Ford frame by clamps, and does not require the removal of any frame parts. The Ford torsion tube, drive shaft, rear axle and spring are detached as a unit and moved back to the end of the extension and there attached. The connection is attained by an extension torque tube bolted to the gearset at the front and to a yoked cross member bolted to the Ford frame. The H-D is made in two lengths for 15- and 30-inch extension. Wheelbase, 115 and 130 inches; gear ratio, 3.63 to 1; price, $55 and $60.

Longford — Motor-Accessory Distributing Co., Boston, Mass.—This outfit is applied to the Ford by overlapping an extended rear frame over the regular frame, forming a telescoping joint at the middle of the assembly. The rear cross member with the rear spring and axle is moved back to the end of the extension, an extension shaft is inserted and a yoked cross member replaces the standard cross member, at the back of the old frame, trusses are applied under both frame reaches and under the axle and two leaves are added to the rear spring.

Auxiliary Hubs, Etc.

Olson—Swedish Crucible Steel Co., Detroit, Mich.—The Olson device consists of a pair of special rear wheels with independent external bearings which depend from the body through the medium of semi-elliptic auxiliary springs. The entire extra body weight is taken by the auxiliary side springs, which have no connection either with the frame of the chassis or the axle. Steel wheels are standard, but wood ones will be supplied to order. The wheel and hub are applied by removing the wheels from the axle and inserting the cast-steel bracket back of the brakes. The Olson wheels are then applied, and the springs, which pivot to brackets, are bolted to the bottom of the body floor or sills. Auxiliary radius rods are provided. Price, $65. Wheelbase, 105 inches; gear ratio, 3.63 to 1.

Camelford—Stewart Mfg. Co., Chicago—This attachment strengthens the rear end of the Ford chassis without changing it materially. A horseshoe-shaped yoke is bolted to the end flange of the housing through the bolt holes of the radius rod on one side and the brake band stud on the other side. To the yoke is attached the spring chair and pad for the semi-elliptic springs and hangers, which are to support the truck body. The Camelford can be installed in 2 hours and makes possible the use of a body 6½ feet long back of the seat. It weighs 110 pounds complete and gives a ¾- or 1-ton capacity for $40.

Chain-Driven Types

Smith Form-A-Truck — Smith Form-A-Truck Co., Chicago—This adapter retains the standard axle by cutting off the brake flanges and bolting the axle to brackets on the auxiliary frame so it becomes a jackshaft. The brakes are in the rear wheels, connected with the standard hand lever. An added feature is a sight-feed oiler for the motor. This is used because of the more stringent duty imposed by truck use. The Smith device is provided with a helper spring over the rear axle. Price, $350; wheelbase, 125; gear ratio, 7 5/11 to 1.

Maxfer—Maxfer Truck Co., Chicago—Few changes are made in the Ford chassis in equipping it with this attachment. The device is of the chain-driven class, with the standard axle, unchanged, as a jackshaft. It has the usual frame extension of full length and standard tread. The latter feature is made possible by the use of a bell sprocket, which brings the teeth back over the brakes. Price, $350; wheelbase, 125 inches; gear ratio, 7 to 1.

Ton-A-Ford—Ton-A-Ford Truck Co., Racine, Wis.—This convertible extension is attached without extra drilling of the Ford frame. The original rear wheels are removed, and one-piece sprockets are fastened to the axle, being housed in the housing of the extension. Double driving chains are then attached to the sprockets and rear wheels. An added feature is that the chassis may be used for a pleasure car body as well as for the extension, which can be slipped out and replaced by the Ford pleasure car parts in less than an hour. The extension weighs about 1,000 pounds and has a capacity of 1½ tons. The wheelbase is 127 inches. A specially designed I-beam rear axle prevents buckling.

Tonford—Detroit Truck Co., Detroit, Mich.—Drilling four holes in the Ford frame permits the Tonford to be attached. The rear spring must be removed, the extension brought up and bolted to the Ford frame, the rear axle bolted to the jackshaft hangers on the extension frame, the rear wheels connected and the application is complete. The Ford axle serves as the jackshaft for the double chain-drive. Price, $325.

Commercial Truckmobile — Commercial Truckmobile Co., Chicago—This adaptor adds a rear unit of the chain-drive type in which the stock Ford axle is used as a jack shaft and the frame is extended, the extension being very wide and strong. The feature of

the attachment is the method of rear suspension being an arched transverse spring in combination with heavy side springs so that the load is balanced over these springs. Price, $325.

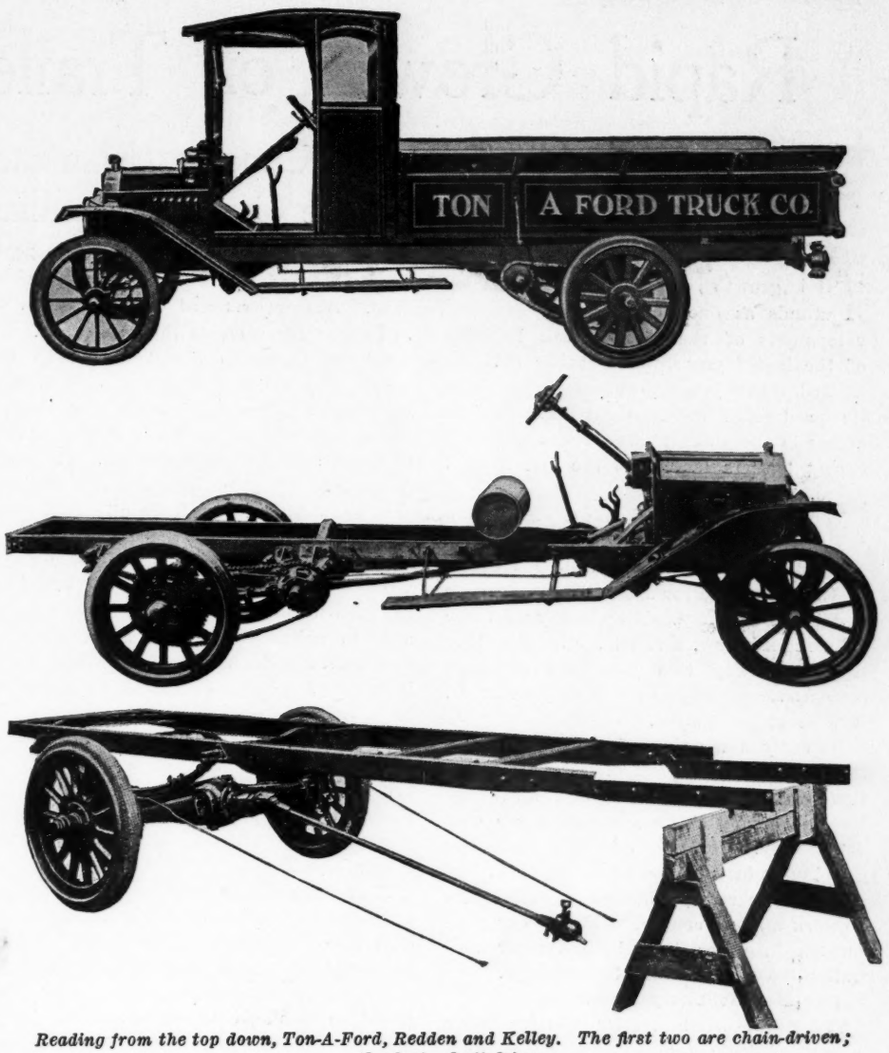
Truckford—Robinson Machine Co., Detroit, Mich., and Eastern Truckford Co., Inc., Buffalo, N. Y.—The Truckford bolts directly over the Ford chassis and can be attached by two men in 2 hours. If desired, it can be removed and the original Ford body replaced, as no change is made in the chassis, except that the original rear wheels are removed and the axles used as jackshafts for the chain-drive over the rear wheels of the extension. Detached, the weight is 875 pounds. It gives a capacity of 1 ton in a loading space of from 8½ to 11½ feet back of driver's seat, according to style of body used. The price is $350, with a 3-months' guarantee against defects in material and workmanship.

Redden Truck Maker—Redden Motor Truck Co., Detroit, Mich.—This is of the double chain-driven type. The Ford axle is used as a jackshaft and is mounted on the auxiliary frame. The frame is slightly wider than the Ford and is telescoped over it and made fast with bolts. The only change in the Ford is the removal of the rear springs and attachment of radius rod brackets in their place. Price, $350; wheelbase, 132 inches; gear ratio, 7 to 1.

Dearborn — Dearborn Motor Truck Co., Chicago—Full length frames are used on this attachment, the extended frame being 32 inches wide and 4 inches deep. It is necked in at the front, where it bolts to the Ford frame on each side of the engine. The other place of attachment is at the rear of the stand frame. Here, the standard axle is attached, the Ford spring being discarded. A helper spring, in addition to half-elliptics on the adapter, is mounted on the rear axle. Price, $350; wheelbase, 108 inches.

Evans—Automobile Mfg. & Engineering Co., Detroit, Mich.—The auxiliary frame does not extend quite to the dash, from whence it flares outwardly, so that its widest portion is at the extreme rear. The auxiliary springs are platform construction. The Ford axle and cross member are both retained, together with the V radius rods to brace the standard axle jackshaft. Wheelbase, 135 inches; ratio on high, 6½ to 1; price, $350.

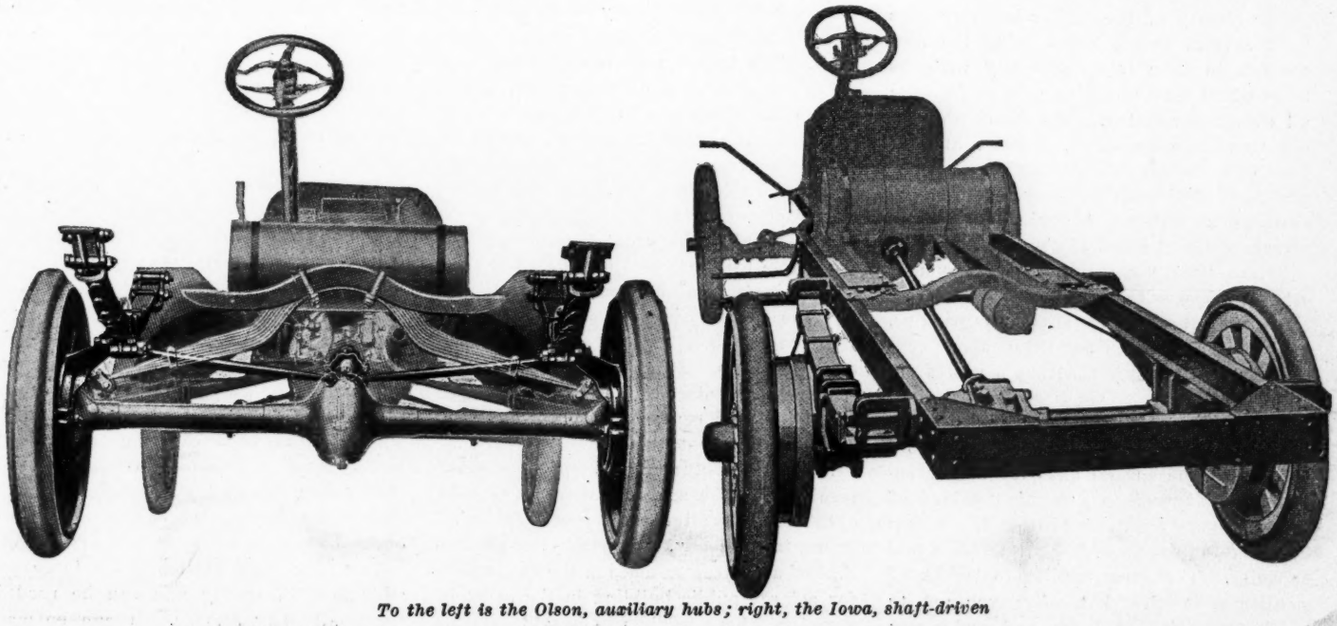
Franklin 2-Way—Franklin 2-Way Converter Co., Chicago—None of the Ford parts are altered in this device. The extension frame lies entirely away from the Ford frame and is secured to it by bolts. Brackets hold the axle to this frame. A helper spring is used over the solid rear axle of the unit. Price, $345; wheelbase, 127 inches; 7¼ to 1 gear ratio.



Reading from the top down, Ton-A-Ford, Redden and Kelley. The first two are chain-driven; the last, shaft-driven

Union—Union Truck Mfg. Co., New York—The Union attachment, while of the chain-driven type, differs from the others in that the Ford axle does not remain intact, but is

(Continued on Page 69)



To the left is the Olson, auxiliary hubs; right, the Iowa, shaft-driven

Rapid Growth of Trailer Industry

Over a Score of Concerns Manufacturing These Luggage Carrying Auxiliaries

THE growth of the trailer industry stands as one of the conspicuous developments of the motor truck industry of the last 2 years. The trailer business existed many years previous to 1914 but its production development and the increase in the number of concerns manufacturing trailers belong to the last 2 or 3 years.

The trailer industry is rapidly attaining the stature of a growing industry. There are today over a score of concerns manufacturing trailers for use with motor trucks and passenger cars. True, many of these concerns are new, a few have been getting under headway this year and although some have scarcely entered on production, they must be counted.

Recently a meeting of trailer manufacturers for the purpose of forming a national association was held, and the formative steps of such an association are now under way. Nothing assists a new and growing industry like an association, but it will be necessary for such an association to work in close contact with truck organizations in order that both tractor and trailer develop to mutual advantage.

Future Not Definitely Known

The stature of the trailer industry today is not definitely known. It has been estimated by trailer makers that there are today between 10,000 and 15,000 trailers in use in the U. S. A. This is a wide range for so small a total and Motor Age does not stand back of the figures other than as being given by some trailer makers.

The history of the trailer industry goes back several years, Knox being the first concern to take it up seriously with its three-wheel tractor design now so familiar all over the country. The Knox pioneering was done by C. H. Martin, at that time with the Knox organization, and now president of his own company, which manufactures a fifth-wheel device for trailer attachment and small trailers.

Following the early Knox development other work was taken up in different sections, so that today an industry is with us, an industry working for its own self-control and an industry that has a useful future ahead of it.

Trailers are being manufactured today in capacities ranging from 600 pounds to 7 tons and some special ones for higher capacities. There is a general standard of trailer capacity best suited for truck use; thus a 5-ton truck uses a trailer of equal capacity. The same applies to trucks of smaller capacities, but when you get to truck capacities of 1 ton and under you frequently find trailers of greater capacity used. A fair standard of trailer load is to have it the same as the truck load.

Of the 10,000 to 15,000 trailers in use today they are not found in any special sections of the country or in any special industries or in use with any special makes of trucks. Their use is general. They are practically suitable for all industries and can generally be used in all industries. Deep mud, slippery road surfaces and deep sand naturally present conditions not favorable to a trailer use, but they are used in such conditions. It is only reasonable to acknowledge that a 5-ton truck will travel faster through deep sand when it is carrying its own 5-ton load than when it is carrying an additional 5 tons on a trailer, which it must haul along. The same applies to deep mud and to slippery hills, due to ice or other unusual conditions. The trailer can be used in such circumstances but speed is naturally cut down a great deal.

A canvass of the field in which trailers are becoming quite general in use gives industries of all kinds. Among them might be noted wholesale drug houses in large cities, large department stores, milk distribution people, creameries, electric light and power concerns, telephone organizations, contractors, plumbers, gas companies and farmers. To this might be added tourists, who are large users of light trailers for carrying camp equipment and baggage.

There is at present much debate in connection with the efficiency of trailers. Like every other question, there are two sides to it. The trailer manufacturer has been up to the minute in collecting cost figures on the use of trailers in different fields of work. On the other hand, truck users have been experimenting as to what are the most favorable fields for trailer use. Trailer manufacturers cite from actual use, showing how trailers have cut the cost per ton mile from 6.6 cents to 5 cents. They show how a single truck has been able to handle 18 tons per day over a 56-mile trip, as compared with a trailer handling 31 tons over 48 miles. It can be seen that the trailer has reduced the speed approximately 15 per cent, but the load carried has been nearly doubled.

From the consumers' viewpoint varying results with the use of trailers have been obtained, but all show a perceptible increase in efficiency. A recent example was that of a contractor making the excavation for a large public building in the heart of the city, where traffic was heavy. It was found in such case best to use a 5-ton truck with 5-ton trailer during the day and to use the 5-ton truck alone, or without the trailer, at night. Under this arrangement the efficiency was the same during day hours as at night. During the day, traffic was slow, congestion very great and the truck could handle its own load, plus that of the trailer, at the speed of street traffic. At night, when the streets were practically empty, the truck could make its regulation speed, and it was found advisable to operate the truck as a unit alone. This example is illuminating in that it points to a great field of trailer usefulness, namely, in congested sections where a truck cannot operate at its intended speed.

One of the great advantages of the trailer is the time saved in loading. A large concern, operating several trucks or tractors, can have a number of trailers, some of which are always at the loading platform while the trucks are at work. One large grocer uses six trucks and nine trailers. By this system he has cut his loading time from 2 hours to 5 minutes. Individual trucks were a failure, due to loading delay, but now trucks have entirely replaced horse equipment because of the trailer cutting down the lost loading time. What this grocer has done is being done in other industries. The trailer is particularly adaptable to all lines of work.

Boon in Certain Instances

There are some industries in which the trailer is a particular boon to the consumer, namely, where the goods of relatively light weight and great bulk have to be carried. On the other hand, we find trailers equally efficient in the transportation of road material, etc. It cannot be argued that they are for any particular field of work, but rather that they are for all fields.

Trailers, according to design, are divided into three divisions, as follows:

a—Four-wheel trailers.

b—Two-wheel trailers.

c—Semi-trailers.

The two-wheel trailer has the load balanced on its axle. The semi-trailer also uses two wheels but the load is not balanced over its axle, rather the front end of the load rests on the tractor vehicle, whether that be a separate tractor or a motor truck. This semi-trailer type is that design brought out by Knox, and is now manufactured by many other concerns.

The four-wheel trailer has a large possible field of utility and can be used in practically any service. It can be made

in wheelbase lengths to meet conditions; in fact, it is flexible in all load-carrying respects. Four-wheel trailers are at present found in all kinds of industries, such as road construction, breweries, motor car factories, general transportation lines, foundry work, lumber, tobacco industries, etc.

The attachment of trailers does not offer any serious difficulties, either when used in connection with motor trucks or passenger cars. It is generally conceded that the trailer must be pulled through a drawbar, which attaches between buffer springs, so that when starting or stopping any consequent jar is absorbed by these springs. This not only prevents the transmission of unnecessary strains to the tractor vehicle but also saves the trailer.

With semi-trailers, where the forward end of the load rests directly upon the tractor vehicle, there is not any necessity for springs, the weight resting on the fifth-wheel construction.

Reversing the Trailer

The question of reversing with a tractor is an important matter when operating in congested zones, narrow streets, alleys, etc. With a semi-trailer, reversing the load into any position is as easily done as with a team of horses. With a four-wheel trailer the ability to reverse calls for special construction. There are trailers which steer through all four wheels and you can back up with them the same as with a unit car. There are other trailers, known as reversible types, with which, when you are backing up with them, you require an additional person to steer the rear wheels of the trailer.

C. H. Martin, president of the Martin Rocking Fifth Wheel Co., which manufactures semi-trailers for Ford cars and a rocking fifth-wheel device, states his company has 400 semi-trailers in use at present and approximately 800 fifth-wheel attachments, all of which has been done since March, 1916. The work is being done by contract, the bodies being built by different wagon factories all over the country.

The Troy Wagon Works Co. started its trailer development movement in 1911, testing its vehicles for 2 years before marketing them. To date 500 installations have been made in this country and many in foreign lands. These trailers are used on more than fifty different makes of trucks. These trailers range from 1½ to 5-ton capacity and have reversible and non-reversible features.

The Watson Wagon Co. has built approximately 500 of its trailers and has capacity today for fifty a week. The greater part of its work is building semi-trailers to be used with the Watson tractor. Watson trailers are used most in connection with repeated hauls over distances of 3 to 10 miles. In this service the company claims that cost per ton mile can be reduced approximately one-half.

The Detroit Trailer Co., Inc., claims to have produced 2,000 trailers to date and to have capacity for two four-wheel trailers and four two-wheel trailers per day. Its trailers range in capacity from 1½, 3 and 5 to 7 tons.

The Miami Trailer Co., marketing light trailers with capacity from 800 to 1,250 pounds, builds these in two-wheel and four-wheel types. The company has built up to date over 2,000 trailers and has factory capacity for 200 per month. The company claims that the extra cost of operating a trailer does not exceed 10 per cent of the original cost.

The Warner Mfg. Co., which began in the trailer field manufacturing light types, will be ready in a few weeks to make delivery on its heavy types with such capacities as 2½, 4½ and 7 tons. Its light trailers have found varied use in connection with passenger cars. Light trailers have a multiplicity of uses with farmers, dairy firms, etc.

Sechler & Co. began construction in the early part of 1915 and started work during the present year. The company has factory facilities for an output of fifty a day. Models of all kinds are manufactured, with capacities from 1,250 pounds up. These trailers are of the four-wheel type, and suitable for all types of bodies and all kinds of service.

Fox Bros. & Co. report having manufactured 200 trailers to date and to have a capacity of five per day. The trailer is a two-wheel design, intended for attachment to passenger cars. It has a capacity of 1,200 pounds.

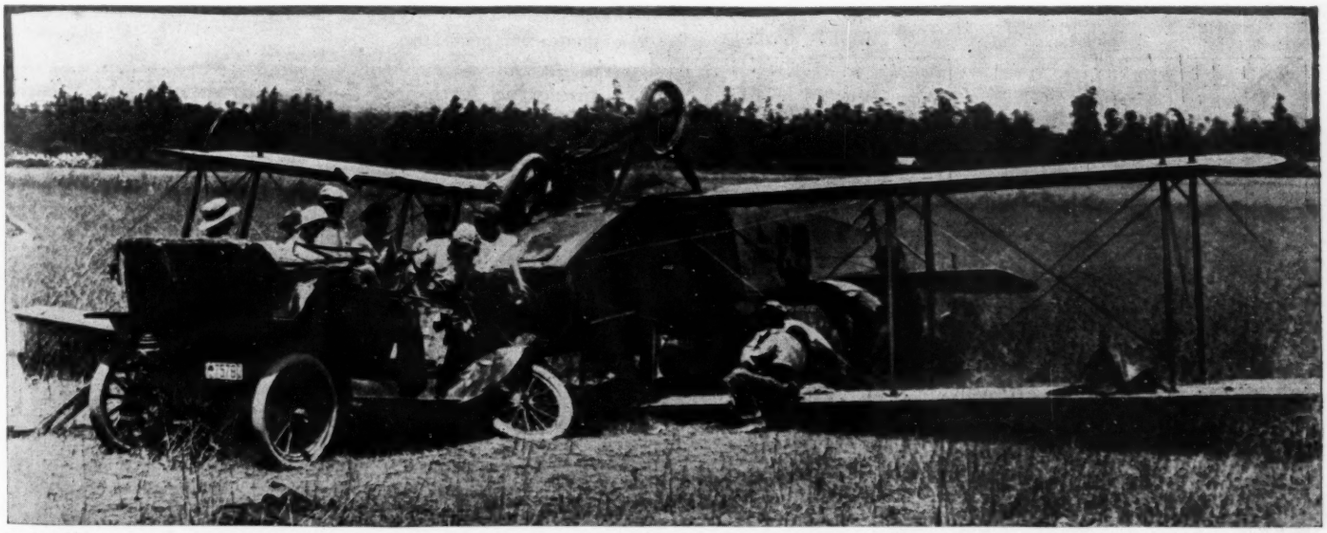
ATLANTIC HIGHWAY READY

New York, Oct. 27—First to be completed of the big border-to-border routes will be the Atlantic Highway, according to figures recently compiled by the Touring Information Board of the American Automobile Association. East of Portland, Me., and from Quebec, Can., to Miami, Fla., there is now less than 100 miles of unfinished highway, in this distance of more than 2,000 miles. Of this 100 miles there has been about 11 in Virginia, divided into three sections, that was vicious, with none of the balance particularly bad.

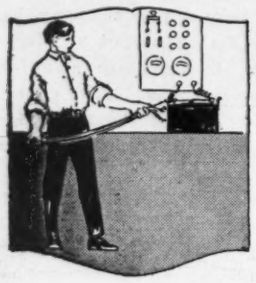
The Washington Bureau of the Touring Board now reports that a new road has been completed for one of these sections; a second section is now being rapidly put into good traveling condition, and the contract let and work started on the third section, which was the worst of all, being that section known all over the country as the Choppawamsic swamp.

GATHER CORN BY MOTOR

Bloomington, Ill., Oct. 28 — Up-to-the minute farmers of central Illinois, are gathering the new crop of corn in motor wagons. They have fitted up boxes upon the chassis of second-hand cars, and go through the fields, gathering the ears of the ripened grain.



WHEN AEROPLANE AND MOTOR CAR COLLIDE
Lieutenant Wheeler in an army aeroplane struck an air pocket in a California flight and wrecked three cars



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the nineteenth installment of a weekly series of articles which began in Motor Age issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

WHAT HAS GONE BEFORE

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems and the relations of current pressure and resistance brought out. This was followed by an explanation of series and multiple circuits, and how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was taken up and the best methods of connections. A separate section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and best methods of charging them. Magnets and electro-magnetism then were considered and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout.

Part XIX—Regulation of Generator Output

As previously explained, the output of a generator in watts is equal to the product of the current in amperes the generator is delivering and the pressure in volts between the terminals of the machine. Either the current or pressure may vary in value, the other remaining practically constant, or both may vary in value. In the majority of cases, however, an attempt is made to maintain either the pressure, frequently called the voltage, or the current practically constant in value, thus giving two main types of systems known as the *constant-voltage* and *constant-current* systems, respectively.

There are four different methods of regulating the output of a generator and they may be classified as follows:

(a) *Inherent Regulation.* This type of regulation is that obtained as a result of the characteristics of the generator without the use of any moving parts. In this class are included cumulative and differential series field windings and a type of generator having one or more brushes in addition to those required in delivering a current to the battery and known as a *third-brush* machine. The field current for the shunt winding is taken from this third brush and one of the main brushes.

(b) *Electromagnetic Regulation.* This type of regulation is produced by the action of electromagnets which may act to increase the resistance of the shunt field circuit or to open the field circuit or to change the connections of the field windings.

(c) *Mechanical Regulation.* This type of regulation is produced by the action of centrifugally operated governors which may act to prevent the speed of the generator increasing above a certain definite value or to insert a resistance in series with the field winding or in series with the generator and the battery.

(d) *Regulation by Ampere-Hour Meter.* This type of regulation is produced by means of an ampere-hour meter, which changes the resistance of the field circuit, depending upon the number of ampere hours that may pass into or out of the storage battery.

All the above types of regulation are found in many different applications and in combination with each other, giving rise to numerous distinctive types as used by the different manufacturers of motor car generators.

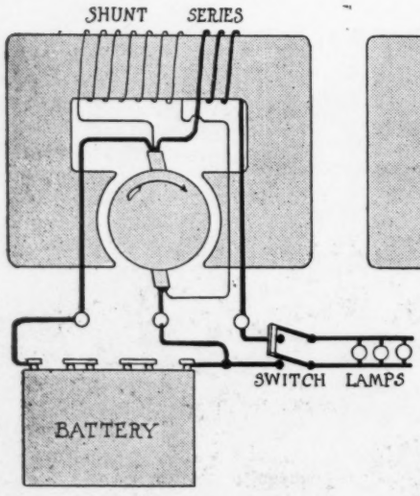


Fig. 135—Regulation produced by cumulative action of series and shunt fields. The series field carries only the current supplied to the lamps

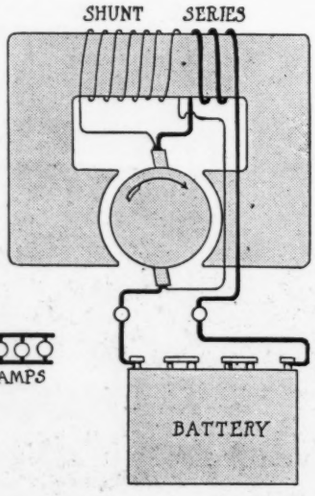


Fig. 136—Regulation produced by differential action of series and shunt fields. The series field carries the total current supplied by the generator

Cumulative Action of Series and Shunt Field Windings

When the magnetizing action of the current in the series and shunt field windings of a generator are both in the same direction, the action is said to be *cumulative,* and the generator is called a *cumulative* compound-wound machine. A compound-wound machine of this kind is used in combination with a constant-speed machine. A good example of such a combination is found in some of the older types of equipment manufactured by Gray & Davis, in which the generators were driven at a constant speed by means of a centrifugal clutch.

A diagrammatic scheme of connections for this type of regulation is shown in Figure 135. When there are no lamps lighted, the shunt winding is acting alone and sufficient pressure is generated in the armature winding to overcome the pressure of the battery and produce a charging current. When the lamps are turned on, the current through them passes through the series field and increases the magnetic field in which the armature is rotating, thus increasing the electrical pressure generated. By a proper adjustment of the turns in the series field in relation to the current taken by the lamps, it is possible to cause the generator to carry the lamp

load and to continue to charge the battery at the same rate it was charging the battery before the lamps were turned on.

Differential Action of Series and Shunt Field Windings

When the magnetizing action of the current in the series and shunt field windings of a generator are in opposite directions, the action is said to be *differential,* and the generator is called a *differential* compound-wound machine. A good example of inherent regulation in which the shunt and series fields produce opposing magnetizing effects is found in one type of equipment made by the Auto-Lite Co. A diagrammatic scheme of connections for this type of regulation is shown in Figure 136. The action in brief is as follows: The voltage of the machine is built up with an increase in speed and shunt field current until the cutout connects the generator to the battery. After this connection is made, a current will be established in the series field winding in such a direction that its magnetizing action is opposite to that produced by the shunt field, and hence the magnetic field is weakened. With a further increase in speed there will be an increase in generated pressure in the armature of the generator, which will cause an increase in the value of the current produced in the series winding and battery and also an increase in the current in the shunt field winding. Since the magnetizing action of the series field is opposed to the magnetizing action of the shunt field, the increase in generated pressure due to an increase in speed will not be as great when both fields are acting as when the shunt field is acting alone. In this case all the current supplied by the dynamo passes through the series field winding.

Bucking Series Field Winding

The bucking series field winding is really a differential or reversed series field winding, the only difference being that the series field winding does not carry all or necessarily a definite part of the current delivered by the generator. The operation of the bucking coil may be explained by reference to Fig. 137, which is exactly the same as Fig. 136 with a coil of iron wire W connected in parallel with the series field winding. The resistance of iron wire increases

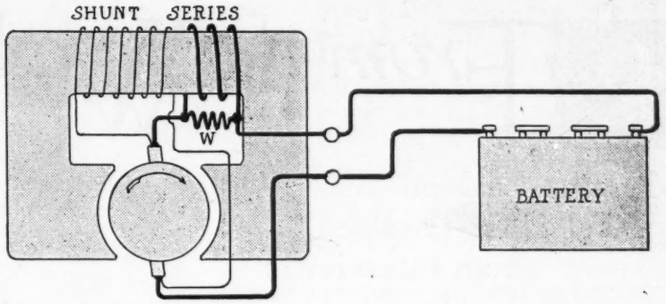


Fig. 137—Regulation produced by bucking-coil. A coil whose resistance changes with temperature is connected in parallel with the series field, which acts differentially with respect to the shunt field. Here the shunt is shown connected directly across the brushes for simplicity, but in practice the terminal shown here connected to the upper brush is connected to the battery line between the battery and the juncture of the series field and ballast coil. This gives a more even pressure

with an increase in temperature and this increase is very rapid after a certain temperature has been reached. Now, when the current delivered by the generator is small practically all the current passes through the coil W, as its resistance is much less than the resistance of the series field winding. As the current delivered by the generator increases, the temperature of the iron wire will increase. Hence, there is an increase in the resistance it offers, and as a result, a larger part of the total current delivered by the generator will pass through the series field winding. This increase in current in the series field prevents as large an increase in generated voltage as would occur if no series field were used. When the current supplied by the generator is reduced, the temperature of the iron wire is lowered and the division of the total current between the series field and coil W is restored to its previous value. This system of regulation is used on some of the equipment of the Bosch Magneto Co.; also on the equipment of the Rushmore Dynamo Works, which is now a part of the Bosch Magneto Co.

NEXT WEEK

The next installment of the series on Electrical Equipment of the Motor Car will take up the operation of the third-brush machine.

Adapting Ford Chassis for Truck Work

(Continued from Page 65)

altered to adapt it to the Union alteration. This alteration consists of the substitution of a special pair of axle shafts for those regularly found on the Ford, special bearings, and the reaming out of the axle housing to accommodate the larger bearings. The auxiliary frame extends nearly the entire length of the standard frame and is riveted front and rear. There is a helper spring over the rear axle. For cash the unit may be bought for $350 and applied to the Ford chassis for $720. There is also a time payment plan. Wheelbase, 125-150 inches; gear ratio, 7 to 1 or 9 to 1; price, $350.

Utility Unit—Utility Motor Truck Co., Chicago—This type is chain-driven with the Ford rear axle serving as a jackshaft. The frame telescopes that of the Ford and no alterations are needed except to remove the rear springs and attach the jackshaft brackets to the Ford axle, to remove the rear fenders, and to connect the foot brake with the rear wheel brakes of the unit. Price, $350; wheelbase, 125 inches; gear ratio, 7.1 to 1.

Woodward—Woodward Truck Attachment Co., Los Angeles, Cal.—For Ford and Maxwell chassis, the Woodward is of the regular chain-drive type. The Woodward frame extends forward to the radiator. The Ford rear axle brakes are retained. Wheelbase, 126 inches; gear ratio, 6.7 and 8 to 1; price, $350.

Wright—Wright Truck Attachment Co., Seattle, Wash.—This is of the chain-driven type, employing the Ford rear axle as a jackshaft and having sprockets which attach to the axle ends interchangeably with the Ford wheels. The frame extension extends from the radiator back, widening out at the dash. In the brake system the connections between the brake lever and the internal brakes on the Ford axle are not disturbed, the brakes in the rear wheels being operated by the pedal. Timken bearings are used in the wheel hubs. Wheelbase, 122 inches; gear ratio, 7 to 1; price, $350.

Uni-Truck—hTe Stewart Mfg. Co., Waterloo, Ia.—The Uni-Truck telescopes the Ford frame and can be attached by a mechanic in 2 or 3 hours. It has a chain-drive from the Ford rear axle, which acts as a jackshaft, to the rear wheels. The frame is a heavy 4-inch channel section riveted and reinforced by gusset plates. The gear ratio is increased to 1 to 7 and the truck has a speed of from 12 to 16 miles an hour. Approximately 90 per cent of the load is carried on the rear axle. The frame has a capacity of 1 ton and costs $350.

Shaft-Driven Type

Kelley—Kelley Convertible Auto-Truck Co., Chicago—The choice of worm or internal-gear drive is offered buyers of Kelley adapters. The device is attached without drilling holes. It has a pressed-steel frame and telescopes with the frame of the chassis and extends only part way forward. Variable wheelbases are offered and the attachments are applicable to Fords, Maxwells, and Chevrolets. Price, $365; wheelbase, 127 inches.

Hudford—Hudford Co., Philadelphia, Pa.—Shaft-drive by internal gears features this device, which comprises an auxiliary frame bolted to the Ford frame alongside the motor, from whence it flares outwardly and back, being bolted to the standard cross member at the back. The standard axle and spring are discarded, a Russell internal-gear driven axle and side half-elliptics being employed instead. The Ford torsion tube and driveshaft are also dispensed with, a single tubular shaft with two universals being substituted. Price, $360; wheelbase, 122 inches; gear ratio, 6 to 1 or 7 to 1; price, $325.

Rayford—Rayford Co., Philadelphia, Pa.—Two very different forms of adapters are marketed by this maker. One is a chain-drive, the other an internal gear-driven form of unusual construction. The latter uses a dead axle, similar to those on chain-drive trucks, but with internal gear rings in the axle instead of sprockets. The Ford axle is used as a jackshaft, but instead of being bolted to the frame, is bolted to the axle and drives the wheels by gear pinions meshing directly with the internal-gear rings on the wheels. The chain-driven type has the feature of standard tread, attained by the use of inward-extended sprockets on the ends of the Ford axle, these sprockets being inter-

(Concluded on Page 77)

From the Woman's Viewpoint

Madame Fashion Tells Her Troubles to an Interviewer

"I'M FRENCH tuckered out," sighed Madame Fashion the other day, when being interviewed as to the probability of a special closed-carmel coat for winter motoring. As she spoke she sank exhausted into her chair just recently upholstered in all the new colors of the season and stretched one hand gracefully across the new duvetyn surface of the bronze-toned desk, where lay several books of her relatives.

She was gowned in a delicate burnt orange chiffon with minute knife plaits interlaced with sky blue beadings and — she had just come from her twin six—with the other hand languidly unbuttoned the sumptuous fur-embroidered motoring coat designed the night before and just then making its debut.

"Let a person work day and night for the ungrateful public, and she gets the same thanks she would if she did nothing — none!" she exclaimed further, absent-mindedly picking up a book of her relatives and turning them in review before her. "Since so many women positively live in their cars I have done everything, both reasonable and unreasonable, to make their existence a joy and a blessing. Coats and hats—both have received my personal consideration. So successful have been my attempts to make the woman motorist a personal triumph, all the coat wearers and hat users have begun to ask for something to motor in, whether they motor on tracks or at pleasure.

"No other season has seen more versatile an offering than this sees now. And I, the originator, the inventor, if you please, of this success must hear that the styles of my coats and hats are ridiculous, overdrawn and extreme in the least."

New Design Soon

Madame Fashion was interrupted at this point by a designer who wished an O. K. on a motor hat showing a jockey bill and a mole head trimming. Upon glancing over the sketch, after proper invitation, of course, the interviewer missed something from the general makeup. It was the eyes of the mole. But this, the draughtswoman pointed out when called on to do so, is not being done this season at all.

Shown by Garment Specialty Co., New York City

Almost needless to say, the design received Madame Fashion's approval. Few advance styles fail to do so, for woe be it unto the designer thereof if the sameness is such as to render any entrant for the vogue race ineligible. That, also, is not being done this season.

New Motoring Coats Show Clever Use of Many Gathers

PROBABLY the newest point about the new motoring coat is the clever handling of the fullness. It does not give the effect of an extreme flare as it did last year and is so well handled it gives the new silhouette of long, straight lines together with fullness. Illustrated on this page is an attractive coat which is quite new in several respects. One may be slender or not slender, as one pleases, and yet wear this coat of wool velour with practically the the same result.

The coat is of a length extremely popular this year. It is a bit longer than three-quarters and yet shows the hem of the skirt. The cape is its particular claim to distinction. The fullness of the side sections are subdued by clever cutting and arrangement. Ruffled, as it is, just below the hip, most of the flare lies below the ruffle. The belt section further confines the play of the fullness, and the fitted section of the back carries out the idea of reserve in flare.

Though the belt is placed almost at the exact waist line, one gets the effect of the long waist Paris is preaching and practicing this year. This effect is heightened by the yoke effect obtained in the treatment of the skirt of the coat.

The model is by Georgette and is made of brown wool velour. A large seal collar and cuffs give smartness and that luxurious, hot-house appearance so much in evidence on the streets of this season. The coat closes high about the neck. The collar, like its fellows of the new fashion, does not hug the neck too closely, but gives a stand-offish impression. The fur cuffs are deep, but do not come to the bottom of the sleeves, another new note.

While approving, however, Dame Fashion, in her own pleasing little way, apologized for the relation between the new design and the adaptations of Mother Nature's originality—the jockey bill and the mole head.

"There are some people," quaintly propounded the arbiter, "even among women motorists, who have in their minds' eyes something unrecallable, which, unconsciously, they look about for in the selection of

hats to buy. They may never know what it is they are seeking. This design will satisfy many, with its jockey bill and mole head. Others will find others. For I, too, have my preparedness and few are unable to find their own peculiar fancies if they search long enough.''

The environment was ideal for new ideas in bonnets and coats. Irish frieze hung at the windows, through which the golden light filtered to the new blue velour that covered the floor. Silken overhangings of charmeuse and Radium lent finish to the window casements, while the walls were covered liberally with draperies of all kinds, among them velvets, silk jersey, satin, crepe, ermine and serge. Colors of many hues adorned the draperies. Orange made room for blue, and red, yellow and green were there. And over all harmony of an expert's treatment reigned.

Madame Dislikes Standard Clothes

Madame, perhaps, does not care for standardized dress, it is suggested by the wily interviewer, who would lead to other questions. The mere mention creates a flurry. Madame is again exhausted. The colors pale, while the beautiful cloths, for whom standardization meant certain death, shrank to the walls. One style, one cloth or maybe two, ruffles gone and foibles crushed by straight cut, shapeless lines—the subject was too painful for the interviewer to press, and haste was made to guide the thought into other channels.

''Closed-carmel coats!'' Madame Fashion exclaimed, upon being gently reminded of the real mission of the interviewer, quizzically lifting the long, delicately outlined eyebrow so much in vogue for motoring and elsewhere just now. ''Close-carmel coats, indeed! Should I live through the dampness of the threatened downpour of Norfolk straps, which I expect to do, closed-carmel coats will be the main interest of my heart. Sew there!'' This last was directed at an assistant technician who had just proffered a blueprint of the latest model of motor hoods.

The interviewer went away, satisfied that for a long while yet to come the woman motorist would have the results of Dame Fashion's invention.

Advice to the Tourist

Though Mrs. Lee A. Scace, Centralia, Wash., boasts of having driven her Chalmers roadster more than 6,000 miles without having to ''get out and get under,'' it is her theory in the case of a smashup or any other accident fluffy petticoats or feminine dainties only add to the confusion. For this reason she prefers to make her trips in motoring togs of distinctly masculine design. She declares this to be the most sensible costume for women who are actually driving their own cars on extended tours.

The occasion of Mrs. Scace's remarks was her own trip from Centralia down the coast to San Diego. She was accompanied by her sister, Miss Lee Sproul. The 6,000 miles had been covered in the vicinity of Centralia, and this was the first trip away from home.

''I believe,'' says Mrs. Scace, who, by the way, also is Dr. Scace, but is designated by the ''Mrs.'' more often to show reason for any strangeness of masculine attire worn by a ''Lee,'' ''that equipped with sensible motoring togs and good road maps a woman can drive anywhere a man can drive, provided, however, that she owns a car conveniently and practically arranged for the woman motorist.

''Never have I driven my Chalmers or previous cars far from my home town. But, knowing I was starting right and that my car was right, I lit out for California with as much confidence as though for a little spin to the postoffice.''

All the trip was not easy, according to the tourists, both of whom were, nevertheless, enthusiastic over the experience.

Beauty Hints for the Woman Motorist

No. 12

TO CONTINUE the red nose discussion begun in the last issue of Motor Age, the best way to ward off the bugbear is to keep the circulation good. No motorist wants to have that florid flush so apt to bring accusations of other reasons, but exposure to wind in driving is hard on the skin, anyway, and tendency to red nose too often materializes. Good blood and good circulation are obtained by proper dieting and plenty of fresh air, the latter of which heaven knows the motorist should have. The individual's job is, then, to keep in this condition.

After good blood and good circulation have been obtained, there are ways of keeping them, such as the hot bath at night and the cold bath in the morning. If you do not react sufficiently to a cold plunge, however, you should not take one. If your teeth chatter and your body quakes, you do not react sufficiently. You should glow and feel a wonderful warmth afterward. If the reaction is complete the red nose will become less red; if not complete, the circulation is not helped and so the red nose will remain red.

The blood is stimulated and has no time for idleness, such as its gathering at the tip of your nose implies, when a quick rub-down after the cold plunge brings a warm glow.

It takes patience to keep warding off a red nose. On raw, cold days cream and powder should be used for this purpose. Put a delicate layer of cold cream on the face and follow it with a fine textured face powder. A small amount of cream is enough. If much is used an oily face is the result. If your skin is naturally oily, you should use a grease cream; if your skin is dry, there is the cream that contains pure oil.

To sum up: The diet and the cold plunge, together with a certain amount of protection from the weather, will make a red nose the bugbear of the past rather than of the present and future.

Feminine Motor Notes

Down in El Paso, Tex., where echoes of the Mexican troubles are loud and where sometimes the echoes are not all that come across the Rio Grande, a woman is making a success as a carbureter agent. Mrs. Mave Maloney is head of one of the larger motor car supply houses in the Southwest and district distributor for the Master carbureter. In connection with the carbureter she has conducted personally tests with army cars and motorcycles and with army and private aeroplanes. She talks the mechanics of carburetion, it is said, as well as any masculine engineer who ventures to debate with her.

Woman in general and woman in particular helped an Illinois agency demonstrate the Knight sleeve valve motor recently. The scene was the Macomb, Ill., opera house. Motion pictures gave a lesson in car driving. Seated at the wheel was a girl, who operated clutch pedal, switch button and other similar mechanisms of the car. The exhibition grew from a recognition of the manufacturers' efforts to make driving easy for women.

Eighty women form the Bibb County, Tenn., Dixie Highway Auxiliary, which has planted 400 trees, had embankments graded and roads widened, organized subsidiary organizations in the county, established councils in Macon and other towns and sent literature on organization to other states since it was started 9 months ago. Only 25 of Bibb county's 550 miles of motoring roads belong to the Dixie highway, but the auxiliary will take up, in turn, all the county highways.

It remained for a Georgia woman, Mrs. Logan Pitts, Calhoun, to introduce the idea of planting trees and flowers along the Dixie highway in the ''Cracker State.'' Mrs. Pitts is chairman of the Dixie highway beautifying committee for Georgia, and the result of her work has appeared already in flower-bordered roads in that section. The farmers have helped in this work, their aid being enlisted wherever possible.

The Readers' Clearing House

Overland 75 Rebuilt for Dirt Track Racing

MEN RESPONSIBLE FOR CAR DESIGN

Impossible to Give One Man Credit for Years of Development

FLINT, Mich.—Editor Motor Age—If possible, I wish you would publish the names of the men responsible for the mechanical design of the following cars. Usually these men will be the chief engineers, but occasionally they are not: Cadillac, four and eight; Overland; Studebaker; Pierce-Arrow; Dodge; Franklin; Fiat; Mercedes; Peugeot; Rolls-Royce.

2—What are the essential features of the Bendix drive for starters?

3—What is the firing order of the Cadillac eight and the Packard Twin Six?

4—What is the Lanchaster vibration damper used on the new Packard, and what is the principle involved?

5—Are the throws on the Packard crankshaft arranged the same as the conventional six-cylinder crankshaft?

6—Is there any angle other than 90 degrees possible between the two-cylinder blocks of an eight? Also, is there any angle other than 60 degrees possible between the two-cylinder blocks of a twin six?—E. S. Waterman.

1—Of course you know that motor car factories change the personnel of their engineering staffs with more or less frequency and furthermore that the present models in each case are developments of models which have gone before. In every instance there have been contributing factors which make it impossible to give one man credit for the design. We list the chief engineers of the makers you mention as follows: Cadillac, D. McCall White; Overland, C. W. McKinley; Studebaker, E. W. Buell, William MacGlashan; Pierce, David Fergusson; Dodge, Russell Huff; Franklin, John Wilkinson; Fiat, Clarence O. Stevens. The last three named are foreign made cars and Motor Age has no record of the heads of these companies since the war started.

2—When power is directed to the starting motor, the sudden starting of the motor throws a pinion out on a worm shaft and directs this worm into the gear teeth on the flywheel. When the pinion has gone into the flywheel as far as the worm will permit the device locks and the pinion starts to rotate the flywheel and thus the motor. To prevent injury to the device, the jerk which is created the moment the starting motor starts to turn the flywheel, is lessened by means of a coil spring through which the shock must pass.

3—Cadillac: Numbering the cylinders from the radiator back, the firing order is No. 1 cylinder on the left, No. 2 cylinder on the right, No. 3 on the left, No. 1 on the right, No. 4 on the left, No. 3 on the right, No. 2 on the left and No. 4 on the right. Right and left are determined by sitting in the driver's seat facing forward, as when driving the car. Packard: No. 1 on the right, No. 6 on the left, No. 4 on the right, No. 3 on the left, No. 2 on the right, No. 5 on the left, No. 6 on the right, No. 1 on the left, No. 3 on the right, No. 4 on the left, No. 5 on the right, and No. 2 on the left.

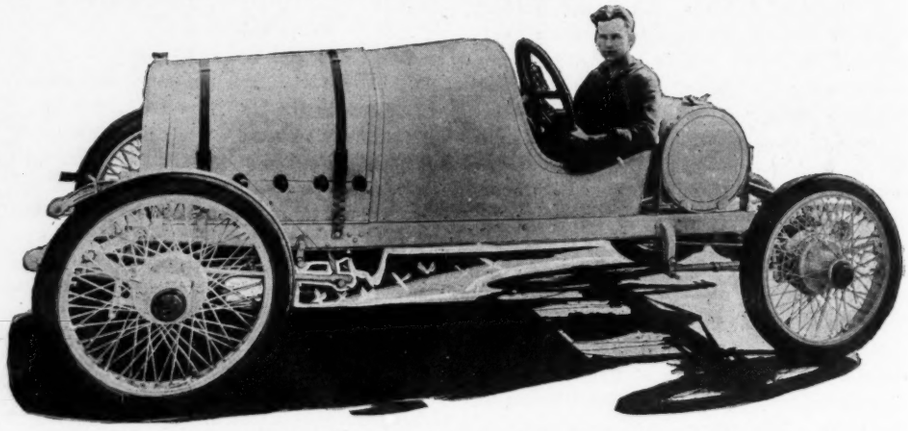


Fig. 1—How an Overland model 75 may be converted into a racing car

4—Roughly speaking, a car spring exerts in recoil a force equal to the force that compressed the spring, less spring action. If you add in the system a shock absorber that increases the friction, both the original deflection and the force and amount of recoil are further limited in proportion to the amount of friction added. This is the shock absorber theory.

Now consider a crank, like a rim nut brace, made of small wire. Fix the socket end, by applying it to the rim nut, and apply pressure at the handle. The whole crank will deflect. Now imagine that this crank handle represents the crank pin of a motor crankshaft, and the fixed end represents the flywheel. The explosion in the cylinder produces a deflection similar to that you have just produced in your light wire crank.

The crankshaft deflection is only a few thousandths of an inch to be sure, but the principle is exactly the same. When you release the pressure on your light wire crank, the handle recoils beyond its normal point and oscillates to rest in the same manner.

In other words, the pin swings like a torsional pendulum, and if the motor is running at such a speed that a second cylinder adds its impulse at a proper time to build up the amount of deflection, you have a condition of periodic vibration, commonly known as a period.

5—Yes.

6—Yes. If the connecting rods on opposite cylinders operate each on their own bearings, any degree is possible.

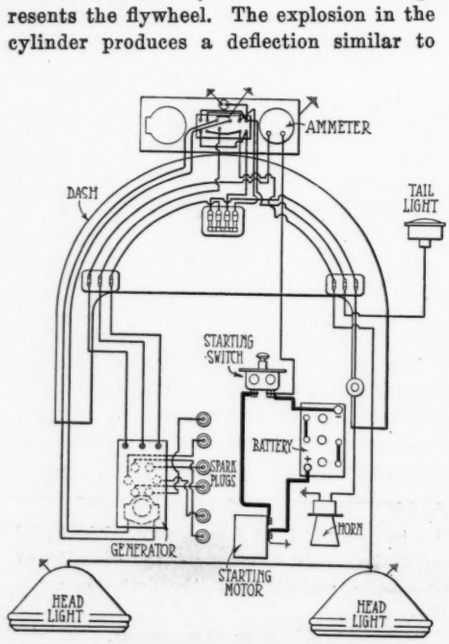


Fig. 2—Diagram of Westinghouse system used on Lexington 40

DOPE WILL NOT STOP BAD LEAK

Radiator Should Be Soldered to Insure a Permanent Repair

Ottumwa, Ia.—Editor Motor Age—I have a small leak in my radiator, not very large, but enough to leak out a gallon or two in half a day. I have tried patent preparations, but to no purpose. The leak seems to be high up, as often a part leaks out, then ceases. What would Motor Age recommend? Is there some home remedy—I believe I have seen bran recommended?

2—Have had considerable trouble with my North East starter and 12-cell Willard battery. The generator did not seem to generate any current and continually burned out the fuses. Used 10- and 12-ampere 25-volt fuses. I finally sent the generator to the Chicago factory branch and they stated it needed a new relay. Can Motor Age tell me what would disable the relay socket so that I could avoid anything of the kind in the future?

3—Could I change my double wire system to single wire, and would this be any advantage? My battery is 12-cell Willard with four terminals, one each for headlights, sidelights, horn and rearlights, three cells to each and wiring all twelve for starter.

4—In case I wanted to use higher voltage headlight bulbs 18 to 24 volts, would it require heavier wire or would the present wire, six-volt lamps, be heavy enough? My idea would be to exhaust all cells equally, at present a few, the headlight cells for instance, and the starter, 24- to 22-volt, fails to work, although the remainder of the cells are in good condition.

5—What causes my engine to run so irregularly? It misses badly when running slow with

or without load and when throttled entirely down it stops of its own accord. It has Bosch magneto with fixed spark A W T carbureter and plugs in good condition, car 2 years old.—William Wind.

1—Your radiator leak is too large for any preparation to stop it. Preparations are only valuable when the leak is very small. First of all we would suggest that you locate the leak. If you can do a good soldering job yourself repair it that way. If you can not, take your car to a reliable tin shop or a garage that can perform such work and have them solder it.

2—The new relay will probably be correctly regulated and you will not have trouble with burning out fuses due to the current being too high. You had better have the charging rate tested with a voltmeter after the new relay has been put in. If it is charging much above the prescribed voltage the relay is not properly adjusted and you should take your car to the man who sold it to you, if he is a dealer, and have him see that the adjustment is correct. Do not try to adjust it yourself. Read the article beginning on page 5 in the October 5 issue of Motor Age.

3—There would be no advantage in changing to single wire.

4—The same wire would take care of it. We would suggest that you do not put in larger bulbs to increase the current consumed. Instead use the cells which discharge fastest, less.

5—There is a multitude of defects which could cause this. Look to your carbureter adjustment and valve adjustment. See that the contact points are clean and seat properly.

REASON FOR CYCLECAR'S DEMISE

Public Did Not Want It After Fair Trial—Roads a Factor

McAlester, Okla.—Editor Motor Age—Why has the manufacture of cyclecars been almost discontinued?—C. R. Mellor.

Probably the principle reason can be attributed to the fact that the public found they did not want cyclecars. The mushroom popularity which struck this country came from England and France where the cyclecar has gained a great popularity. In those countries the roads, in cities and in the rural districts are rivals of our best boulevards and the narrow tread, light weight car was thoroughly satisfactory. In the United States, where we have rutted, bumpy roads, where the ruts are cut into a 56-inch track, the cyclecar was found to be a misfit—at least from the public's viewpoint.

When roads in this country reach the state of perfection that they have abroad it is reasonable to expect that the cyclecar will again find an important place.

Take a car with a 36-inch tread, which was a size used by a majority of the cyclecar makers, onto a country road in which deep ruts have a soft sand layer between them.

To drive the narrow tread car out of both ruts and in the sandy center of the road requires a lot of power, makes steering difficult and requires the driver's constant attention to keep the car in the road. Driving with the wheels on one side in the rut and on the other side in the soft sand, leans the car over to one side and gives the passengers a cramped back if the trip is of any length. Steering is also difficult in this case.

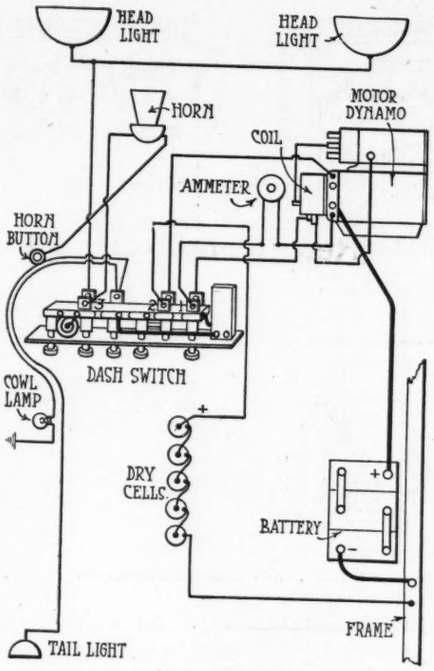


Fig. 3—Wiring diagram of Delco system used on 1915 Patterson

A BAFFLING ELECTRICAL TROUBLE

Motor Fires When Warm and Pulling Heavy—Misses Otherwise

Minatare, Neb.—Editor Motor Age—I have a 1915 model Reo car, equipped with a Willard battery and model O B Remy generator, combined with ignition. This car has been driven 8,000 miles in 16 months without any trouble, when I noticed that the car would not run idle or light as usual without popping and backfiring, also it did not start as well and usually missed on one or more cylinders until well warmed up. To remedy this, I took off the carbureter to see that it was clean. I have the storage battery overhauled and recharged and then cleaned the carbon from the cylinder heads and put in new spark plugs. None of these changes seemed to help. Then I took the car to a repairman. He took out the circuit breaker and found that the platinum points were badly burned. He put in a new point and properly adjusted them, which seems to help somewhat, but the ignition is still poor. It misses badly and backfires and pounds until warmed up, then it seems to do all right when the engine is pulling steady, but when running light, misses and pounds badly. Can Motor Age tell what is the cause of the trouble?—H. C. Blood.

Again Motor Age is obliged to say that it is next to impossible to direct an owner to the cause of a motor missing, by a letter description of how the car acts. Have you looked to your spark plug points? These should all be adjusted with an even gap of about $\frac{3}{32}$ inch. You might do well to have your coil tested by an electrical man to see if it has lost any of its efficiency.

HEADLIGHT BULBS ARE IRREGULAR

Difference in Efficiency of Lamps Has Several Causes

Jackson, Miss.—Editor Motor Age—I have a 1913 Hupmobile 32 equipped with a Westinghouse starting and lighting system. I am having trouble with the left headlight which does not burn so brightly as the right one. What is the cause and remedy?

2—What is the bore and stroke, horsepower and gear ratio of the Ford owned by Paul Harvey of Chicago, the car with which he won the Chicago Ford race in September?—A. C. Johnson.

1—Possibly you have lamps of two different kinds, one of which is not as powerful as the other. Possibly one of the lights is older than the other. The efficiency of these lamps decreases rapidly with age. Then again the focus may be wrong. Focus your lights so that they will project a clear, round spot of light on an object about 40 feet ahead, this spot to be about 2 or 3 feet in diameter.

2—Mr. Harvey does not care to give out this information.

OVERLAND 75 REBUILT AS A RACER

Illustration Shows This Model Converted Into Speed Machine

Charleston, W. Va.—Editor Motor Age—I have an Overland model 75 which I desire to alter into a racing car for half-mile track work. Have you, by any chance, an illustration of such a car? I am willing to go to considerable expense, say $600 or $700 to make the job right. Is it your opinion that 70 miles per hour would be a possibility?—John R.

It happens that the manufacturers have been able to furnish us with a photograph of a model 75 Overland built over into a racing car and we are illustrating this in Fig. 1. This particular car has been doing dirt track racing this season with much success. There is no reason why you could not speed the car up to 70 miles per hour. Your expenditure in building a car such as illustrated, with aluminum pistons, higher gearing, etc., should come well under the figure you name.

VALVE-IN-THE-HEAD SUPERIORITY

Reader Asks Why One Maker Builds Two Motor Types

Stevensville, Mont.—Editor Motor Age—In what respects is the valve-in-the-head motor more efficient than the L-head motor, and why is it that a motor-car concern will make one size car in valve-in-the-head style and another in L-head style.

2—What speed is the Oakland 6, 1916 model geared for?—E. F. Cherry.

1—As a matter of theory the valve-in-the-head motor is more efficient than the L-head type because it permits the location of the valves directly above the pistons

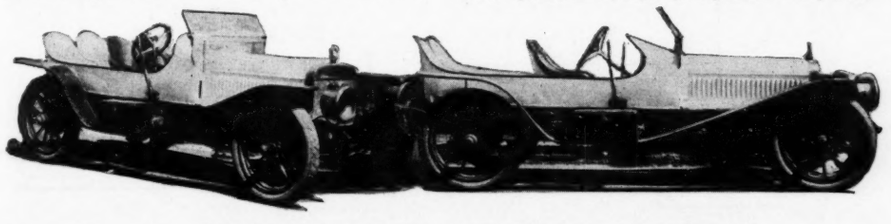


Fig. 4—Old Winton rebuilt into four-passenger speedster

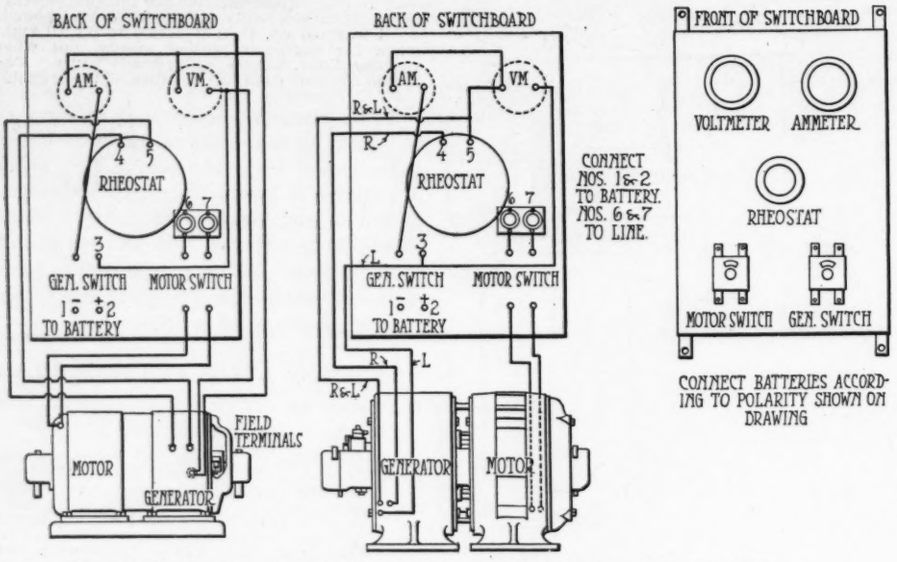


Fig. 5—How to wire Eaco charging outfit with ammeter, rheo state and voltmeter

allowing quicker inlet and exhaust of the gases. The matter of the same concern building both types is something our of our ability to explain. It is the engineer's preference and he has his reasons, varied of course, for advocating the different types.

2—The Oakland six, as well as any other stock gear, is not geared for a certain speed. It is geared to give the most efficient transmission of the power of the motor to the driving wheels under all conditions of roads. There is no official record of the speed of the Oakland six.

CANNOT RUN WITHOUT BATTERY

Danger of Burning Out Generator Windings by Such Practice

Marshall, Mo.—Editor Motor Age—Give instructions for adjusting the generators after the battery is taken out of the car, as I have heard that if something is not done to the generator after the battery is disconnected it will burn out the generator.—E. Hammer.

There is no way of adjusting the generator, or, in fact, any of the electrical equipment, to give satisfactory operation with the battery removed. If your car has a distributer ignition system, you cannot run it without the battery. If it has a magneto which is a separate unit from the starting and lighting system, the only safe way to operate the car, if the battery is removed, is to disconnect the generator entirely so it will not operate.

If the generator is allowed to run without having a battery connected into which the current generated may be put, the voltage will build up at high motor speeds with the possible and very probable result that the armature windings will burn out.

Incline for Garage

Milwaukee, Wis.—Editor Motor Age—I am interested in the construction of a garage in Milwaukee in which we expect to have an incline leading up to the second floor. Kindly give any information you can regarding the maximum grades which are feasible for motor cars to ascend and descend for such purposes, as I understand these inclines are used quite generally in the East.—R. E. Newton.

You can consider any grade up to 25 per cent although something around 15 per cent would be safest, if you really find an incline necessary. An incline takes enough valuable space to buy a good elevator in our opinion.

Overland Gear Ratios

Aguilar, Colo.—Editor Motor Age—What is the gear ratio on low, second, high and reverse of the model 83 Overland?

2—What is the ratio of the differentials?—N. C. Peet.

1—Low, 11.28 to 1; second, 6.8 to 1; high, 3.7 to 1; reverse, 14.5 to 1.

2—3.7 to 1.

Maximum R. P. M. of the Reo Six

Grand Rapids, Mich.—Editor Motor Age—What is the maximum speed in r. p. m. of the new Reo Six?

Communications Received and Inquiries Answered

E. S. Waterman.....Flint, Mich.
William Wind.....Ottumwa, Ia.
C. R. Mallor.....McAlester, Okla.
H. C. Blood.....Minatare, Neb.
A. C. Johnson.....Jackson, Miss.
John R.....Charleston, W. Va.
E. F. Cherry.....Stevensville, Mont.
E. Hammer.....Marshall, Mo.
N. C. Peet.....Aguilar, Colo.
R. E. Newton.....Milwaukee, Wis.
Raymond Burns....Grand Rapids, Mich.
Weaver & Stanley.....Herrin, Ill.
J. W. Allison.....Olatter, Mo.
C. R. V. Seutter....West Jackson, Miss.
C. G. Brickbauer.....St. Louis, Mo.
Ballinger Auto Co.....Ballinger, Tex.

No communication no signed by the inquirer's full name and address will be answered in this department.

2—What speed can this car obtain under normal conditions?

3—Is there any noticeable vibration from the engine in speeds exceeding 30 miles per hour?

4—Show horsepower curve of the Reo Six—Raymond Burns.

1—The revolutions per minute at which the maximum horsepower is obtained is 1,750.

2—There are no official records of the speed.

3—No.

4—There is no curve available.

6 AND 12-VOLTS IN COMBINATION

How to Wire Battery of Twice the Capacity as the Generator

Herrin, Ill.—Edtior Motor Age—Tell how to connect a 6-volt Dyneto generator, a 12-volt storage battery and a 20-0-20 ammeter. Also show where to take off the leads to the lights so that the discharge will show on the ammeter. We have this equipment installed on a 1912 Maxwell Mascotte, but do not understand how to make the proper connections.—Weaver & Stanley.

We have prepared a wiring diagram to assist you which is given in Fig. 6. You will note that the two dotted lines show the connection to the outside poles of the battery. Arrange your wiring so that one wire will reach to both of these terminals. Switch this wire from one terminal to the other once a week. You will then have a six-volt system, only using half of the battery at a time.

Patterson Wiring Diagram

Slater, Mo.—Editor Motor Age—Publish diagram showing how to install an ammeter on a 1914 Patterson.—J. W. Allison.

The diagram is given in Fig. 3. It may be installed at any convenient point on the wire designated.

Rebuilt Winton

West Jackson, Miss.—Editor Motor Age—Having noticed several cuts in Motor Age of rebuilt cars I thought some of your readers might be interested in the body I have built on to my old Winton. This is my idea of an ideal combination of a speedster which will carry four passengers.—C. R. V. Seutter.

The car is illustrated in Fig. 4.

Lexington Diagram

St. Louis, Mo.—Editor Motor Age—Can Motor Age furnish me with a diagram of the Westinghouse lighting and starting system used on the Lexington 40?—C. G. Brickbauer.

The wiring diagram you ask for is illustrated in Fig. 2.

Eaco Charger Diagram

Ballinger, Tex.—Editor Motor Age—We have an Eaco battery charging set and do not know how to wire with ammeter, rheostat and voltmeter.—Ballinger Auto Co.

A wiring diagram showing how to connect the instrument is shown in Fig. 5.

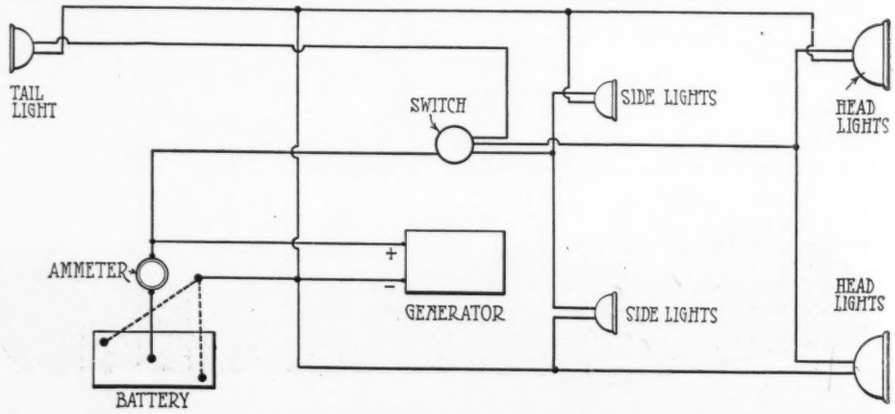


Fig. 6—Method of wiring 6-volt starter with 12-volt storage battery

The Motor Car Repair Shop

Hints on Adjustment of Carbureters

ADJUSTING a carbureter consists in regulating the proportion of air and fuel in the gaseous mixture so that the mixture may be consumed to the best advantage in the motor. As for the ways and means of doing this, it all depends upon the construction of the carbureter, and the facilities for adjustment. Before adjusting a carbureter one should always endeavor to learn how to perform the operation by consulting either the manufacturer, or his literature, or some user who has successfully done the trick.

There are so many different designs and constructions now in use, that no rules can be given that will enable one to successfully adjust all types; however, there are a few rules which will apply to many designs.

For instance, an experienced mechanic would begin by assuring himself that there is gasoline in the main tank—you will be amused at this statement, possibly, but the writer can call to mind a dozen instances where owners have set their carbureters in a variety of ways to get the motor started, when the tank was dry. Then he would ascertain that the gasoline was getting to the float chamber—that there were no clogs in the gas line.

Clear Fuel Line

Most carbureters have spray nozzles, so, if possible, an effort should be made to see if the fuel is passing through the nozzle or nozzles when the float chamber is flooded. This can be done by attempting to start the motor by cranking it a few times, noting at the same time whether the compression is fairly even in all cylinders. It is difficult to adjust a carbureter properly when the compression is not about equal in all cylinders; for poor compression in one or more cylinders will cause weak explosions, or misfiring in those cylinders.

Before any adjustment on a carbureter is changed—and these adjustments are changed much too often—one should look for every other trouble which would cause the same misbehavior of the motor. The carbureter is about the last thing to get out of order and once adjusted should give practically no trouble, adjustments only being necessary at the time of a decided change in temperature.

There is a sort of standard group of troubles connected directly and indirectly with the carbureter, that should be known before carbureter adjustment is attempted.

For example, a rich mixture—one in which the proportion of fuel abnormally exceeds the amount of air—many be due to faulty adjustment of the float or air valve, a clogged air inlet pipe, dust and dirt on the inlet pipe screen, a leaky float valve, or a fuel saturated float—waterlogged so to speak.

Section of an old tire used as foot support to facilitate handling of accelerator pedal. This home-made comfort giver was seen attached to a Mercer

A poor mixture, on the other hand, may be due to faulty adjustment of the air or float valve, a leak in the inlet manifold or around the carbureter, or connection between the manifold and motor, the fuel supply valve may be partially clogged or there may be water in the gasoline.

If the motor cannot be started the spray nozzle, float valve, or feed pipe may be clogged, the gasoline tank empty, the supply cock shut off, or, with a pressure-feed system, the pressure in the tank too weak. With a vacuum-feed system it may be that this instrument is not feeding enough gasoline to the carbureter, due to some derangement in the vacuum tank.

Troubles in Certain Types

In addition to these troubles there are many that pertain to certain types and kinds of carbureters. These are important to know about, and it is because of them that one should learn the shortcomings and principles of construction of his carbureter from some one else who has had experience.

The illustration on this page shows an ingenious and simple foot rest to be placed behind the accelerator lever in such a position that the instep of the foot will rest upon it. It is a section cut through a worn-out tire and fastened to the floor boards, at the beads of the tire, with small screws. This is superior to the block of wood so frequently used for the same purpose because it not only gives a comfortable rest for the foot but affords a non-slipping surface which can not wear off.

It is a most common error of the new motorist to overload his car, either with passengers or luggage, to such an extent that, during the first few months or year of its use, the car is subjected to unusually severe strains. The result is that tires do not stand up as recommended; the car shows neither the power nor speed of the demonstration car upon the performance of which you bought yours; the springs seem to flatten out or break before the year's guarantee has run out; brakes do not work efficiently; and the general wear and tear on the entire chassis mechanism makes the repair bill at the end of the season seem unreasonably large.

Of course, it is difficult at times to prevent overloading a car; but under such circumstances, the driver should make his trip at a slower rate of speed, take the bumps more easily and bear in mind that the additional weight is going to make the brakes more difficult to operate with the same efficiency as is evident with the normal load.

Winter Brake Adjustment

The time of the year has come when the motorist is considering the removal of the open body and replacing it with a closed one. One very important factor should be borne in mind, if an inclosed body is to be equipped, and that is brake adjustment.

Since the enclosed body additions means a great increase in weight, it is evident that serious trouble might result should the brakes be neglected. Just before the car equipped with the winter body is ready for actual use, the brakes should be thoroughly tested. This car should be run at the rate of 25 miles per hour and the brakes suddenly jammed on. It should be noted whether or not the rear wheels slide, that is, if they grip the ground firmly, at the same time. One wheel should not slide before the other and both should hold the pavement at the same time the brake pedal is thrown.

Neglecting to adjust the brakes, especially in cars with heavy sedan or cabriolet bodies, invariably cause rear end collisions and possibly worse accidents, the brakes not being able to resist the momentum of the increased weight.

In the lining of the brake itself the owner should remember that a band which fits the drum tightly can be 75 per cent more efficient than one which touches on about half the surface. Worn or ill-fitting linings should surely be replaced as a factor of winter safety.

Pressure of Finger Slides Rear Wheels

The Prest-O-Vacuum Brake Is Operated by Motor Suction

SUCTION from the manifold, which ranges from 8 to 12 pounds per square inch in orrinary four-cycle motors, may be transformed to a maximum pull of 4,000 pounds per square inch directed to the rear brake levers in the Prest-O-Vacuum brake, a new product of the Prest-O-Lite Co., Inc., Indianapolis, Ind.

The device consists of an automatic valve, operated by a pedal or a lever on the steering column, located between a pipe line which leads to the intake manifold and another pipe line which leads to a cylinder with a 7-inch bore and 4-inch stroke, attached to the chassis of the car. The piston of this cylinder connects with a toggle joint, as shown in the illustration, which in turn pulls on the service-brake rod from the point in the toggle where the greatest leverage is obtainable.

The valve automatically regulates the amount of suction transmitted from the motor to the cylinder, this amount depending on the distance the pedal is pushed down or the hand lever moved, which ever method of control is employed. The construction of this valve will be explained later. Atmospheric pressure is approximately 14 pounds per square inch. It is therefore reasonable to assume that by exhaustion of the air from the space above the piston in the cylinder atmospheric pressure against the other face will exert at least 10 pounds pressure.

4,000 Pounds Pressure Possible

With its 7-inch diameter and 4-inch stroke the piston has a displacement of 39 square inches which, with the 10-pound pressure exerted will, of course, give a direct pull of 390 pounds. This, in turn, is compounded through the toggle to give the 4,000-pound pressure. This is merely an example of the capabilities of the new brake, as 4,000 pounds would seldom be found necessary, unless in large trucks.

A representative of Motor Age drove a Packard twin six and a Velie, the former equipped with a hand operated vacuum brake and the latter with pedal operation. In ordinary driving, through traffic and over hilly country roads the flexibility of the brake could not be questioned. The Packard was put up to 35 miles per hour, the brake lever applied—with a touch of the little finger—and the rear wheels locked, both of them, so that the car slid in a straight path up the road. With one of the brakes thrown out of adjustment, it was again found possible to lock both wheels evenly, as the extreme pressure possible took up the difference through the equalizers. Then again, driving at any speed, it was possible, by a shorter movement of the lever to give the brakes the very slightest touch so that their effect was hardly noticeable. Any degree of pressure between these two was easily obtainable.

The lack of effort required in operating the Prest-O-Vacuum brake has its instant appeal to the woman driver

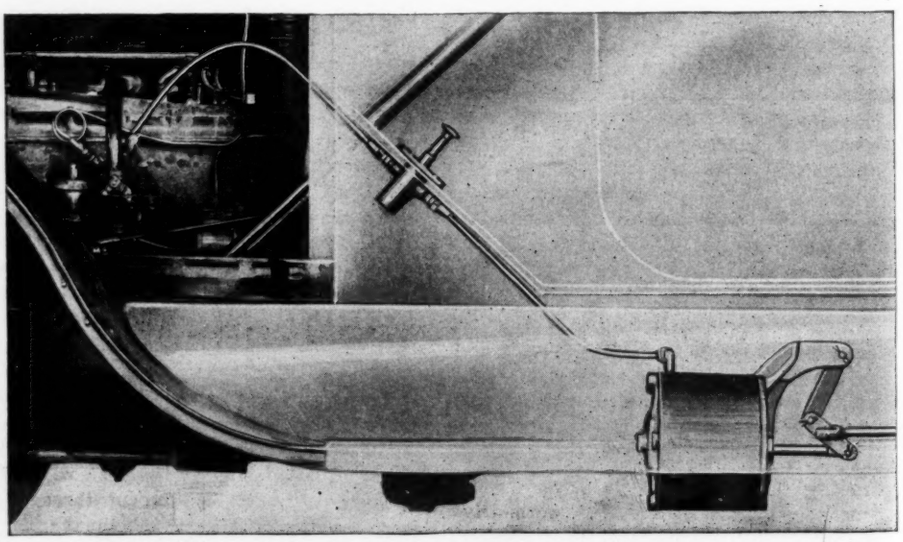
The brake will operate with enough force to slip the wheels as long as the motor is turning over. As an example of this the Packard was driven by the starting motor alone, meaning that the car was traveling possibly ½ mile per hour. Full application of the brake lever locked the wheels. It might be noted here that the brakes on the Packard were so set that it was necessary to throw the entire weight on the regular brake pedal, which was connected to the same levers, in order to slip the wheels. In descending steep declines where it is possibly advisable to turn off the ignition and leave the clutch engaged, the brake will operate as efficiently as it will with the motor under power.

Will Exert Pull on Bands Up to 4,000 Pounds Per Square Inch

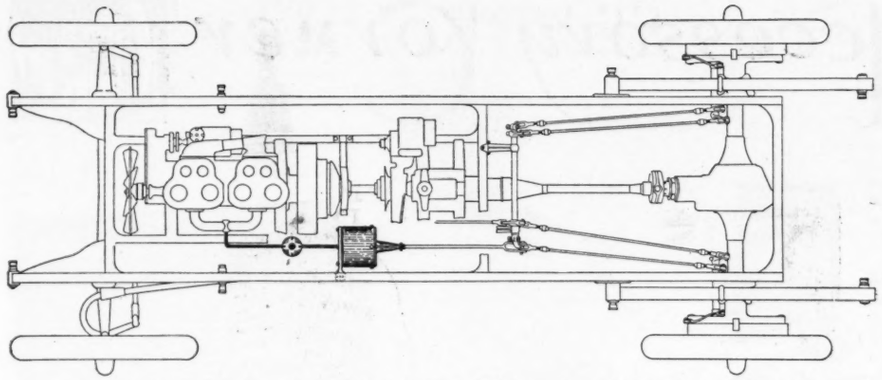
In the pedal operation as applied to the Velie, driving through crowded traffic was a revelation. The pedal was located directly beside the accelerator. Through the most crowded traffic, operation of the car was simply a matter of oscillating the foot from the accelerator to the brake pedal and vice versa, about the same amount of foot pressure being required to operate both. The car was driven into a steep ditch, the brake applied with the foot, a shift made into reverse, the foot switched from the brake pedal to the accelerator and the car slid out without difficulty.

There is no mechanical principle in the devise which is new. The cylinder is very similar to the air-brake cylinders used in braking of railroad trains. With a pressed-steel shell and a cast-steel head, the entire cylinder weighs in the neighborhood of 12 pounds. The thin steel piston embodies a leather plunger, similar in design to the type used in locomotive air brake cylinders, which have been shown to give 7 years' service before replacement was necessary.

The automatic valve has four main parts. A barrel, the operating lever, a piston and two springs. As will be seen by reference to the cross section of the valve, the pis-



Phantom view showing all connections of Prest-O-Vacuum brake. The pipe extending forward from the pedal valve is attached to the intake manifold. The other pipe leads to the braking cylinder



Plan view of chassis with Prest-O-Vacuum brake equipment in place. Note the simplicity of installation

ton floats between the two springs. The lower spring is a retaining member.

By pressure against the lever to any given distance, the large spring is pushed down, carrying with it the piston and thus opening the valve which permits a suction to be conducted from the intake manifold to the braking cylinder. The pressure in the space in which the large spring is located equalizes with the pressure in the suction end of the braking cylinder, atmospheric pressure exerts itself against the piston in the valve, through the vent in the bottom, which causes the piston to rise against the spring and shut off the suction from the manifold, at the same time withholding a constant amount of suction in the braking cylinder. By releasing the operating lever the piston rises further so that the atmospheric pressure forces air through the vent in the bottom of the valve, through another vent into the pipe leading to the operating cylinder and thus equalizes the pressures on each side of the piston in the operating cylinder, thus releasing the brake.

Instant Brake Release

The release is almost instantaneous, so rapid, in fact, that it is impossible to shift the foot from the brake pedal to the accelerator quick enough to catch the brakes.

Tight connections are unnecessary. As a matter of demonstration, a system was connected up with each union turned in place with the fingers only. To aggravate conditions a pipe was inserted between the valve and the manifold which was drilled through. Still the device worked perfectly.

The vacuum brake is the invention of Benjamin G. Kramer, who is now associated with the Prest-O-Lite Co. in its manufacture. It will be marketed with a view of furnishing brackets for attachment for all well-known makes of cars, both as a factory equipment and a retailing proposition. Although it was primarily designed for pleasure car use, particular emphasis is laid on its merits as a part of worm-drive truck equipment, especially in very heavy trucks where, because of the worm-drive construction, a propeller-shaft brake is inadvisable and it is difficult to create sufficient leverage with a foot-operated brake actuating on the rear wheels.

ADAPTING FORD CHASSIS FOR TRUCK WORK

(Concluded from Page 69)

changeable with Ford wheels. Price, $300; wheelbase, 124 inches.

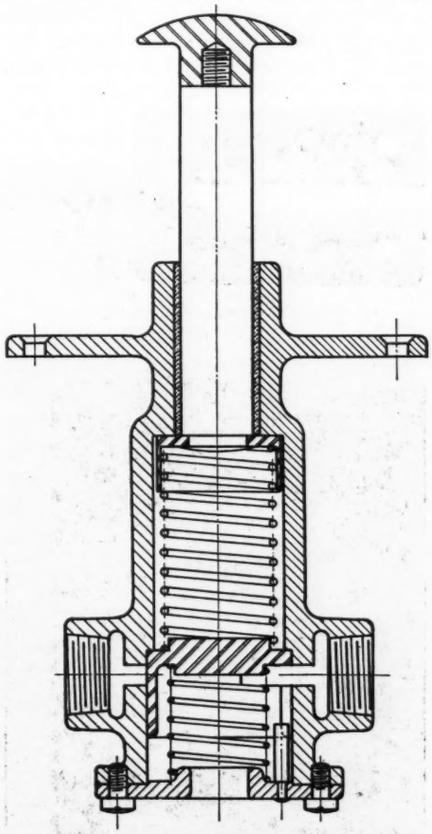
Lakeside—Lakeside Motor Truck Co., Chicago—The maker of this attachment claims it will fit any car. It has a rear solid axle without chains, gears or sprockets and a gear reduction between the universal joint and the transmission case which makes the ratio leverage about 6½ to 1. The rear tread is 56 inches, and standard wheelbases are 118 and 124 inches, though any length up to about 140 inches can be furnished on a heavy one-piece 4-inch channel frame. The price is $295.

Jewett—Jewett Car Co., Newark, O.—Internal gear-drive is used on this adapter, which requires discard of the entire Ford rear system. The frame extension is similar to other adapters, attaching to the standard frame just in front of the dash. The rear axle is Russel equipped, with special pull rods extending forward to the hand-lever shaft. A special shaft with two universals is used to connect the axle with the gearset, the driving stresses being taken through the springs. Wheelbase, 102 inches; gear ratio, 7.4 to 1; price, $375.

Make-a-Truck — Make-a-Truck Co., Chicago—This is an internal-gear driven attachment in which driving pinions are fitted on the Ford axle and mesh with internal gears in the special steel wheels.

Iowa—Iowa Motor Truck Co., Ottumwa, Ia.—Two models of practically identical design, differing in length, are offered by this maker. These are both internal-gear driven, Russel axles being used. The extension frame parallels the Ford frame for its full length, widening out at the dash. The standard axle and rear spring are discarded, together with the driveshaft. Torsion and propulsive stress are taken by the springs. Price, $450; wheelbase, 108 inches; gear ratio, 7 .o 1; price, $375 and $450.

Ames-ton—Ames Motor Co., Owensboro, Ky.—The feature of the Ames-ton is the Empire 1-ton worm drive axle, which is used with a differential. It weighs approximately 450 pounds and is capable of a load of 3,550 tons on the tires. The Ford frame is used as a sub-frame. The attached frame is 160 inches long. Semi-elliptic springs and solid rubber tires are used. The change requires a few hours. Complete, the Ames-ton is $395.



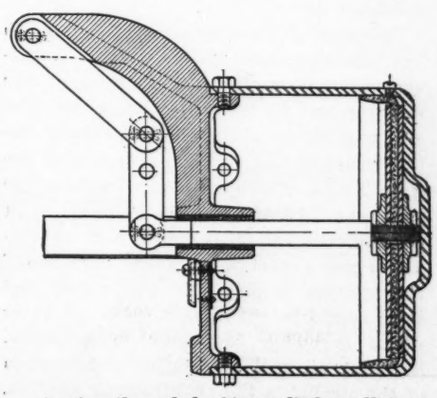
Section through automatic valve of vacuum brake, showing piston floating between two springs

UNITED MOTORS BUYS RADIATOR CO.

New York, Oct. 31—Special telegram—The Harrison Mfg. Co., Lockport, N. Y., has been purchased by the United Motor Corp. The Harrison company manufactures radiators. The same policy will be followed with regard to the Harrison company as with other concerns which the United Motors Corp. has taken over. The purchase of the Harrison company brings the total United Motor purchases up to eight companies, these being Hyatt, New Departure, Delco, Remy, Perlman, Klaxon, Brown-Lipe, Chapin and Harrison.

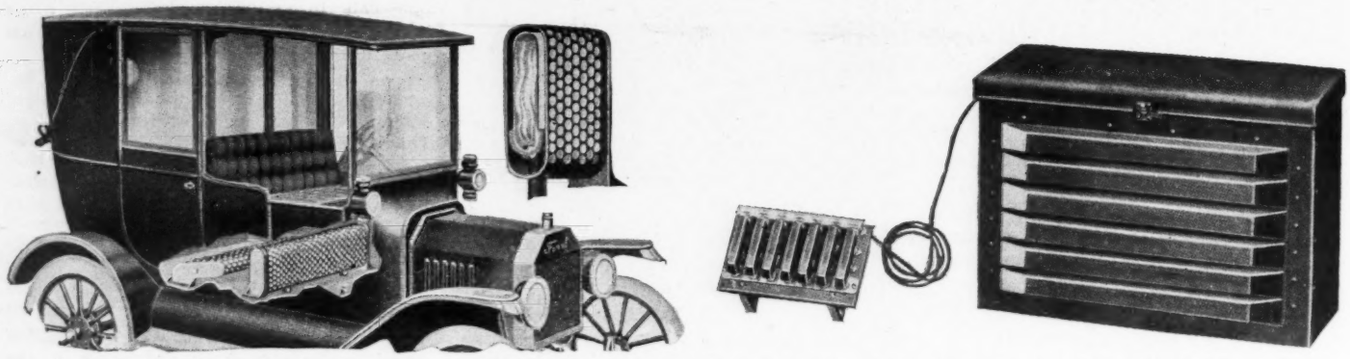
RAILROAD CAR SHORTAGE GROWS

Detroit, Mich., Oct. 30—The freight car shortage is now greater than was ever before experienced at this season of the year. On September 30 there was a net shortage of 61,030 cars as compared with a surplus of 13,027 cars October 1, 1914, and of 78,299 October 1, 1915. Railroad men believe the greatest point of shortage will be reached next month.



Section through braking cylinder. Note simplicity of construction

The Accessory Corner



Left—Simply constructed heater which utilizes exhaust gas. Right—Instrument with which current from storage battery is utilized to produce music

Exhaust-Gas Heater

THE Kenney radiator utilizes exhaust gases which passes into a heater containing an inner heat drum of sheet steel and exits from pipes at either end which carry the gases away from the passengers. The inlet pipe of the heater is provided with a valve which may be operated from the seat, making it possible to turn the heater on or off at will. There is a perforated sheet-steel enameled outer casing which fits over the inner heat drum, with air space between from which the warm air emerges. The heater may be used in either the front or rear compartment or both. The inventor has applied for patents. He is D. B. Kenney, Huntington, W. Va.

Automatic Windshield Hinge

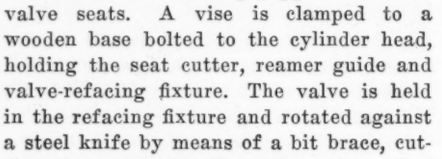
The Illinois automatic windshield hinge permits eight positions of the windshield either ahead of or in back of the upright position. The hinge fastens on the side of the shield and its adjustment is automatic. The steel hinges sell for $2.50 and $3.50, depending on the size. There are also two sizes with bronze brackets with prices ranging from $6 to $7.50, depending on the size and finish, whether polished bronze or nickeled finish. Illinois Brass Mfg. Co., 226 W. Ontario street, Chicago.

Radiator Oil

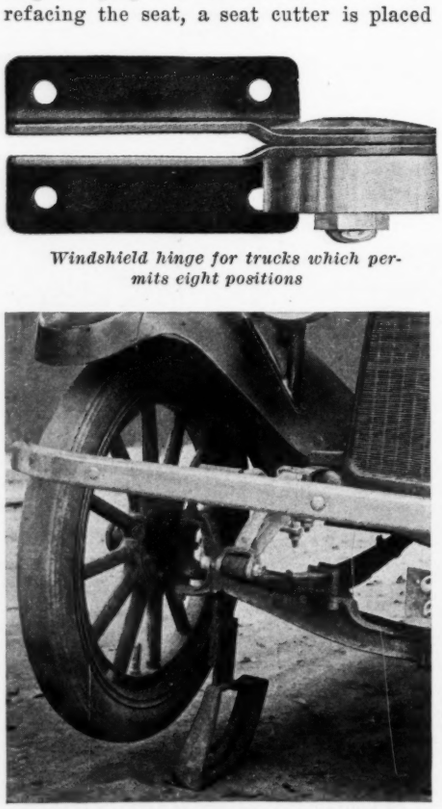
Radiator oil is a new compound which has been developed for the purpose of preventing rust, scale, and clogging of the radiator and to assure perfect circulation and will be a running mate to Opco carbon remover, the two being known as the Opco Twins. Opco radiator oil softens the water and dissolves scale and rust as it accumulates, and thus insures a free circulation and prevents clogging. A little of the solution is placed in the system and some should be put in each gallon of water which is added to replace evaporation. Radiator oil will also reduce evaporation of the alcohol in the anti-freezing mixture, it is said. Price is $1 per can. The carbon remover is an oil mixture for removing carbon and is designed to act on the deposit in such a way that it will soften it and completely remove it. It also sells for $1 per can. Both are sold under money-back guarantee. They are products of the American Oil Products Co., Buffalo, N. Y.

Valve Dresser and Reseater

A device for refacing poppet valve and valve seats. A vise is clamped to a wooden base bolted to the cylinder head, holding the seat cutter, reamer guide and valve-refacing fixture. The valve is held in the refacing fixture and rotated against a steel knife by means of a bit brace, cutting the proper bevel on the valve. For refacing the seat, a seat cutter is placed in the pilot stem and rotated by the bit brace. It is claimed that warped valves may be refaced and seats finished without chatter marks. Price, $30. Ellis-Smith Mfg. Co., 216 Niagara St., Buffalo, N. Y.



Windshield hinge for trucks which permits eight positions



Jack which lifts car by power of car itself

Ulticoat Heat-Proof Paint

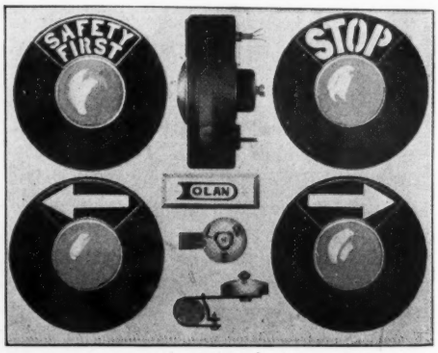
A mineral paint for the exhaust pipe, muffler, hood and all metal parts subject to heating. It is claimed that heat causes the paint to stick harder to the surface to which it is applied. Price, $1 per can. Porcelain Products Co., Pittsburgh, Pa.

A Band on a Motor Car

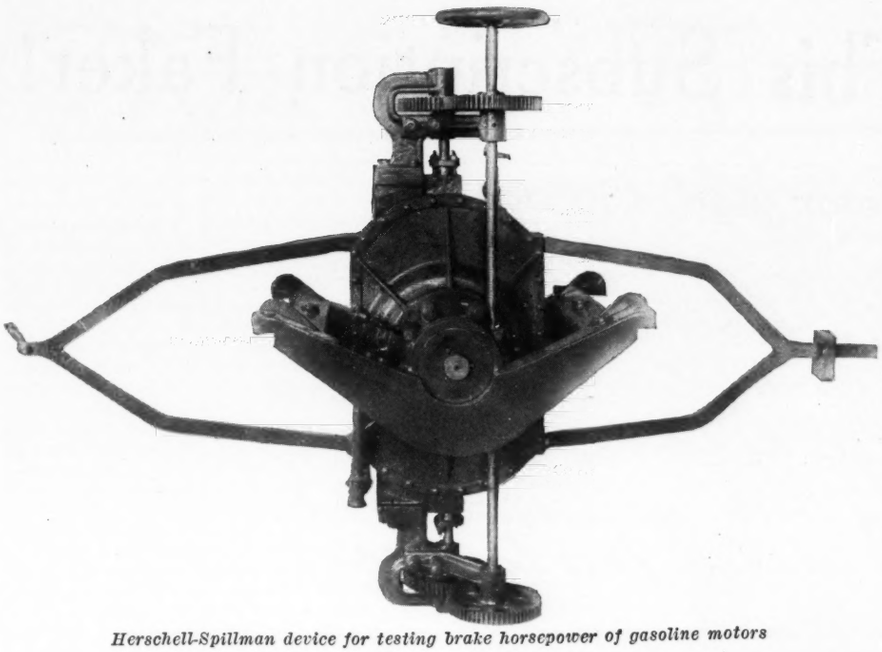
The Autola is a musical instrument designed to be placed on the running board of a car. It is composed of a number of musical units, each of which is alloy-steel bar, equipped with a resonator. The music is produced by vibrating the steel bars with a specially constructed electro-magnet. There is a keyboard connected to the instrument by electrical cable. The instrument is, of course, electrically operated and can be played with the current from 6, 8, 10 or 12 volts. The price, complete, is $48. Bartola Musical Instrument Co., Oshkosh, Wis.

Dolan Safety Signal

The Dolan safety signal is electrically operated. The control is bracketed on the steering wheel and works from the same electric circuit as the horn. The bull's eye



Complete equipment of electrically-operated safety signal



Herschell-Spillman device for testing brake horsepower of gasoline motors

combination signal and tail lamp replaces the regular tail lamp. Signals are visible day or night. Arrows show whether the driver intends to turn to the left or right. The price, ready for installation, is $12. Detroit Safety Signal Co., Inc., 935 Majestic building, Detroit, Mich.

Oscillating Jack

With the rotary jack it is only necessary to insert the jack against the axle, get in and drive the car ahead and the wheel automatically climbs up on the jack. It is constructed on the rotary lever principle and is composed of two main parts, there also being an adjustable feature for different heights of axles. It is made of malleable iron and weighs 7 pounds. The price is $2.50. Rotary Jack Mfg. Co., 340 Moore Bldg., San Antonio, Tex.

Compact Brake Test

In order to meet the demand for a simple method of testing motors for horsepower, Herschell-Spillman Co., North Tonawanda, N. Y., has introduced a brake for testing, which consists of a double rotating turbine, two stationary turbines enclosed in a water-tight compartment, and four

Sheet steel deflector for Ford exhaust pipes

gates to shut off the water to prevent it passing from the rotating to the stationary turbines. In operation the water enters the brake through holes in the stationary turbine blades which are formed in the heads of the water-tight compartment. The brake is filled with water until it comes out of the overflow valve; then it is started up and the rotating turbine throws the water against the stationary turbine and it in turn returns it to the rotating turbine, thus causing the necessary resistance. By opening the gates more water is allowed to pass back and forth, thus increasing the load, and by closing the gates, the load is decreased. The brake is mounted on roller bearings. On one of the extending brackets a spring balance can be attached, or any other convenient method be employed for weighing the load. The other arm is provided so that a weight may be attached equal to the weight of the scale. The gates are operated by hand wheels. The brake will take care of a 5¾ by 6 six-cylinder motor, as well as the smallest types.

Generator and Vaporizer

The Star Generator Co., Logansport, Ind., has placed on the market a generator and vaporizer applicable to Ford cars, and special designs for other cars on application. The devise is interposed between the carbureter and the intake manifold and the manufacturers guarantee an increase in mileage of 33⅓ to 50 per cent on a mixture of half gasoline and half kerosene and claim elimination of carbon deposits, dirty spark plugs, and misfiring from excessive oil. The price is $20.

Commercial Bodies for Fords

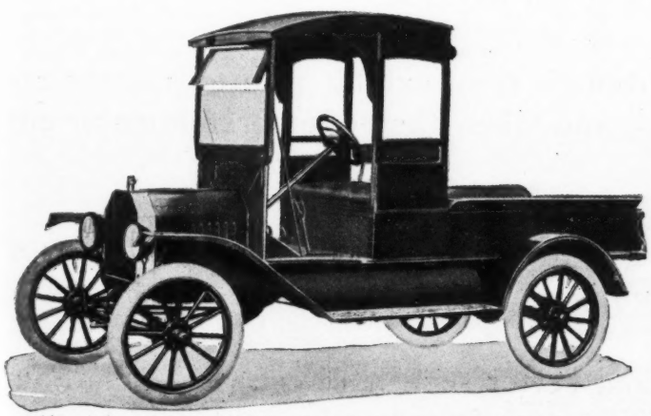
The Parry Mfg. Co., Indianapolis, Ind., has introduced a large line of commercial bodies for use on Ford cars. There are open bodies with skeleton seats, slip on bodies for Ford roadsters, express bodies with express tops, express bodies with screen sides, panel-top bodies, cut-out front panel-top bodies, an extra long panel body known as the metropolitan, vestibuled panel bodies, etc.

Deflector for Ford Exhaust

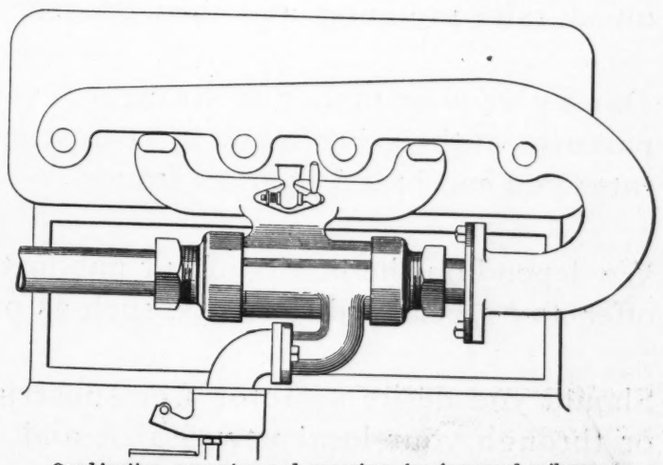
The Corcoran Mfg. Co., Cincinnati, O., introduces a sheet steel deflector which is designed to be clamped onto the end of Ford exhaust pipes to turn the exhaust dirt and grease away from the spare tire and rear end of the car. It is furnished finished in black enamel with bolt and nut ready for attachment and lists for 25 cents.

Keystone Spring Oiler

An oil pocket is held tightly against the sides of the spring by means of three coiled springs. As the leaves of the spring go and come with the motion of the car, it is claimed that the lubricant is automatically spread between the leaves. The oiler may be attached to any car, and needs to have the oil supply renewed monthly, it is said. Price 25 cents. M. & M. Co., Cleveland, O.



One of many commercial bodies for use on Fords, produced by an Indianapolis manufacturer



Combination generator and vaporizer for increased mileage

Beware of This Subscription Faker!

Motor Age, Chicago

Date 10-4 1916.

RECEIVED OF M. R. Shaffer

Two 00/100 DOLLARS

For One years Subscription

Beginning 10-7-16 Ending 10-7-17

Premium Modern Motor Car

MOTOR AGE,

Per Frank Graham

5

This is a sample of FAKE RECEIPT

When last heard of he was operating in Archbold, Ohio, and used the name of C. A. CHASE. He has also signed himself Frank Graham, A. B. Cutler, Frank G. Skeen, C. A. Harper. These are only a few of numerous aliases he is using, and apparently he has a new one for each city. He has been described as "A good dresser, over 6 feet tall and weighs about 170 lbs."

He has taken a number of Motor Age subscriptions at the regular rate of $3.00 and at cut rates. He offers, as a premium with each subscription, a copy of the book entitled "The Modern Motor Car," notwithstanding the fact that Motor Age does not offer subscriptions with premiums or at cut rates.

Should you be approached by this party, detain him on some pretext and immediately **telephone the police.** Prefer against him the charge of obtaining money under false pretenses and then **telegraph us** at our expense.

Don't give your money to strangers even though they exhibit printed matter apparently authorizing them to represent us, **and when they offer premiums or cut rates you can brand them as frauds.**

We depend on the merits of our publication to get and keep subscribers, and do not offer any special inducements, such as premiums.

Should you desire a Motor Age subscription, better send it direct via Uncle Sam or through your local newsdealer, and advise your friends who contemplate subscribing to do likewise.

From the Four Winds

JERSEY License Receipts High—The total receipts of the New Jersey motor vehicle department, from all sources, from January 1 to October 1, 1916, amount to $1,328,000. After September 1 the license fees for cars were cut in half, but despite this the total receipts of the department give promise of reaching better than $100,000 above the estimate made early in the season.

School Warning Signs Placed—Throughout southern New Jersey many signs have been prominently placed bearing the legend "Danger—School-House Ahead." These are placed several hundred feet each way from the building on all roads leading past schoolhouses and have been effective in reducing the speed of motor vehicles and preventing many accidents.

Jersey Tag Estimate 150,000—It is estimated by the New Jersey motor vehicle department that 150,000 pairs of license tags will be needed for 1917. Commissioner Dill has placed an initial order for 120,000 pairs and these are to be ready for issuance by December 15. The colors will be white numerals on a background of national blue.

Motor Cars for Railroad Use—The Pennsylvania and New Jersey Railroad, a carrier operating in the northern part of New Jersey, will use motor cars as coaches on a short line between Whitehouse and Gladstone, N. J. Motor cars with special bodies and flanged wheels are believed to be the solution of the passenger traffic in many small communities and short line railroads, and as they have many times been suggested by citizens who wanted faster and more frequent service, the experiment will be watched with considerable interest.

Ohio Has 232,017 Cars—August 24 there had been 232,017 motor cars registered in Ohio during the preceding 12 months. This includes 224,700 individual gasoline cars and 4,443 electric machines registered by owners and 2,874 cars registered by dealers.

With the Motor Clubs

Club Champions Sign Law—The Wayne County Automobile Club, Wooster, O., has started a campaign for the strict inforcement of the law requiring county and township authorities to erect direction signs at all road intersections.

Howell Heads Hoosier Club—Walter Howell was elected president of the Hoosier Motor Club, Indianapolis, Ind., at an election held last week. Other officers elected follow: Vice-president, Frank L. Moore; second vice-president, Roy Adams; third vice-president, B. E. Griffey; secretary, M. E. Noblet, and treasurer, R. V. Law. The annual meeting of the club is scheduled for November 2.

Club Fund to Convict Thieves—At a recent meeting of the Piqua Automobile Club, Piqua, O., steps were taken to create a fund to pay for the arrest and conviction of thieves stealing club members' cars. The fund will be created by subscription as well as from the collection of increased dues. A membership campaign has been started to increase the membership to 200.

East Liverpool Club to Reorganize—The East Liverpool Automobile Club, East Liverpool, O., will be reorganized, as a result of a decision reached at a recent meeting. In accordance with this plan, President E. L. Bradfield, Vice-President Maurice Newman and Secretary Samuel Groglode resigned. Howerever, the three retiring officials were later named to serve until the next meeting, when officers will be elected for the remainder of the fiscal year which expires February 1, 1917. The recommendation that the membership fee be advanced from $5 to $10 a year, submitted by a special committee appointed by President Bradfield, was adopted. An effort will be made to secure 200 members. The club proposes to assist financially in road and danger signs, maintain a headquarters and affiliate with the Ohio State Automobile Association.

CAR SPREADS HEALTH DOCTRINE—This is a moving picture, motor car evolution of the old-time Kickapoo Indian Medicine Man and his medicine wagon, which has been originated in Wisconsin and is now touring the rural districts of the state. It is the health car of the Wisconsin Anti-Tuberculosis Association. The man in charge of the wagon is Ted Werle, known as the motorcycle health evangelist and the originator of the Anti-Tuberculosis Association's famous "flying squadron of health." The days are spent in visiting the farmhouses and distributing literature. In the evenings moving picture shows and lectures are given in the nearest village or town, the audience gathering from the surrounding country.

Coming Motor Events

RACES

—1916—

*November 16—Vanderbilt cup race, Santa Monica, Cal.
*November 18—Grand prize race, Santa Monica, Cal
*November 30—Speedway, Los Angeles, Cal.
*December 25—Speedway, Los Angeles, Cal.

—1917—

May 19—Metropolitan Trophy, New York speedway.
†May 30—Indianapolis speedway.
†June 9—Chicago speedway.
June 23—Cincinnati speedway
†July 4—Omaha speedway.
†July 14—Des Moines speedway.
†July 28—Tacoma speedway.
August 4—Kansas City speedway.
†September 3—Cincinnati speedway.
†September 15—Providence speedway.
†September 29—New York speedway.
October 6—Kansas City speedway.
October 13—Chicago speedway.
October 27—New York speedway.

* Sanctioned by A. A. A.
† A. A. A. championship events for 1917.

MEETINGS

January 9-11—Mid-winter meeting, Society of Automobile Engineers.

SHOWS

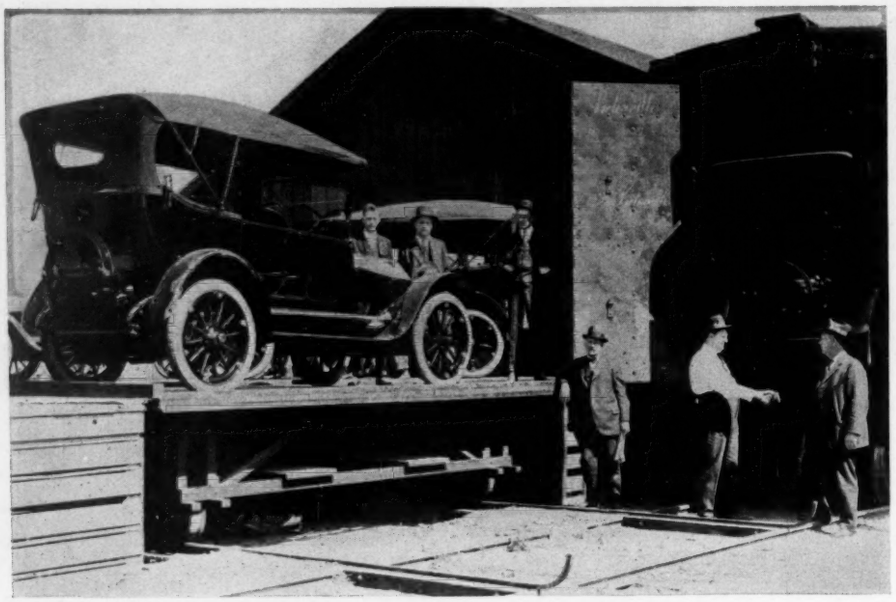
January 6-13—New York show.
January 13-20—Montreal.
January 27-February 3—Chicago show.
February 18-25—St. Louis, Mo., show.
February 26-March 3—Omaha, Neb., show.
March 3-10—Boston.
March 6-10—Fort Dodge, Ia., show.

Good Roads Activities

Spend Huge Sums on Roads—State, county and municipal bodies in New Jersey have appropriated upward of $2,000,000 on improvements of roads leading to Atlantic City, the country's premier seashore resort. The Meadow boulevard, heretofore the only approach to Atlantic City from the mainland, was paved this summer at an expense of $200,000. Work started recently on a new cross-meadow highway into the city from Absecon, which will cost over $250,000. The new Somers Point-Ocean City boulevard and the Somers Point-Longport boulevard, both new roads that join in approaching the city from the south, represent an outlay of $650,000; and work will soon commence on the paving of the White Horse pike from Hammonton to Absecon at a cost estimated to be close to $700,000.

Open New Roads—The purchase of 20,000 acres of land in eastern South Jersey by the Bethlehem Steel Co. will be the means of opening many miles of new road in that part of the state, and, needless to say, it will be good road from the very necessities of its use. This tract, which is said to be the largest in use for ordnance proving in the world, lies within a section that has been nearly wild and untilled and the building of these new highways will open up much undeveloped country. One hundred men have been set to work to clear up timber and brush in the line of the new roads.

Among the Makers and Dealers



NEW DEVICE FOR UNLOADING MOTOR CARS—Here is shown a device for saving time in unloading motor cars. It is the invention of C. A. Dundas, Studebaker dealer at Riverside, Cal., and consists of a platform on a level with the freight car floor, the platform being on wheels and moving over tracks. The motor car is rolled off from the rear of the freight car on to the movable platform. The picture shows the Studebaker which has just been rolled on the platform and a second in readiness. The Santa Fe railroad officials thought so well of the scheme that they have made arrangements with Mr. Dundas to have the device installed.

HUMPAGE Goes to Wilt—F. R. Humpage has resigned as manager of the Dyneto Electric Co., Syracuse, N. Y., to become affiliated with the Wilt Twist Drill Co., Walkerville, Ont., in the capacity of secretary-treasurer and general manager.

Crank Shaft Company Increases Capacity—The Auto Crank Shaft Co. has sold its entire business and assets to the Automobile Crank Shaft Corp., which was recently incorporated under the laws of New York, with a capital of $1,000,000. The transfer of the business was made solely for the purpose of increasing capacity. J. M. Hibbard, who was secretary and treasurer and general manager of the Auto Crank Shaft Co., will retain his position with the new corporation.

Tractor Co. Increases Capital—The Four-Drive Tractor Co., Big Rapids, Mich., has increased its capital from $50,000 to $200,000.

U. S. Rubber at Des Moines—The United States Rubber Co. will open a branch factory and distributing point at Des Moines, Ia., in accordance with arrangements made by F. R. Brown, factory representative. It will be housed in a new building to be erected at Eighth and Mulberry streets. A force of 100 men will be employed.

Columbia Motors Leases Plant—The Columbia Motors Co., Detroit, Mich., has leased the plant of the Michigan Steel Boat Co. and will take possession early in December.

Jones Opens Detroit Office—The Jones Motor Car Co., Wichita, Kan., has opened a permanent office for its purchasing department in the Kresge building, Detroit, Mich.

Sproat Olds Works Manager—H. J. Sproat is now works manager of the Olds Motor Works, Lansing, Mich. He will have entire charge of the producing organization of the Oldsmobile factory.

Hal Under New Name—The H. A. Lozier Co., Cleveland, has brought the name of that company into harmony with the car they manufacture and has reincorporated as the Hal Motor Car Co. H. A. Lozier has retired from the company.

Iowa Has Over 190,000 Cars—Iowa already has over 190,000 cars registered for 1916 and the total of registration fees has been $1,636,000, or an average of $8.58 per car. The number of dealers registered is 2,641 and the fees from dealers amount to $86,547.

Miller Leaves Frisco Bosch—B. R. Miller has resigned as manager of the San Francisco branch of the Bosch Magneto Co. and Lee C. Carlton, previously in the engineering department at the main office in New York, has been appointed to take his place.

Smalley Moves Up—George O. Smalley has been made first vice-president and general manager of the Bound Brook Oil-less Bearing Co., Bound Brook, N. J., succeeding the late Leigh S. Bache. Mr. Smalley has been connected with this company for the last 10 years.

Studebaker in Texas Building—The Studebaker Corp. is now occupying its new building at Fort Worth, Tex., where it will conduct sales under the supervision of L. B. Alford, district manager for Texas. The new structure is 150 by 265 feet, two stories high and costs $60,000.

Recent Incorporations

Akron, O.—C. E. Mills Taxicab and Transfer Co.; incorporator, Charles E. Mills; capital stock, $2,500.

Akron, O.—C. E. Mills Taxicab and Transfer Co.; $25,000; to operate a taxicab company; Charles E. Mills, Rose Ella Mills, J. B. Huber, S. A. Allen and Francis Sieberling.

Beaver, Pa.—Lincoln Highway Garage, of Beaver, capital, $5,000; Harry Pfaff, Roy Campbell, G. P. Burlett.

Boston—Associated Tire Manufacturers, Inc.; $5,000; Harold W. Mackierman, E. E. Mackierman and H. J. Pettibone.

Boston, Mass.—Liberty Motors, Inc.; capital, $25,000; Winthrop M. Jameson, Winthrop S. Jameson, Nana E. Joseph.

Cleveland, O.—Black and White Cab Co.; $500; to operate a taxicab company; Gustav von den Steinen, I. L. Evans, Paul J. Bickel, J. B. Putnam and F. E. Brown.

Cleveland, O.—Sawyer Gear & Mfg. Co.; $15,000; to manufacture motor car parts; Wm. Sawyer, H. W. Kilpatrick, D. H. Wilder, O. W. Johnson and E. Miller France.

Cleveland, O.—West Center Sales Co.; $25,000; to sell motor cars; John A. Nally, R. A. Lang, William W. Hysell, Walter C. Ong and E. G. Nally.

Columbus, O.—Oakland Pittsburgh Co.; capital, $40,000; W. C. Faunce, Andrew P. Martin, Frank J. Santry, Fred C. Wood and C. E. Sederland; to handle motor cars.

Danville, Ky.—Danville Motor Co.; capital stock, $5,000; incorporators, T. F. Durham, D. W. Mahan and J. W. Mitchell.

Dayton, O.—Dayton Motor Sales Co.; $10,000; to sell motor cars; M. W. Jennings, H. F. Jergens, F. W. Bartling, F. A. Shepler and N. G. Jennings.

Dayton, O.—Dayton Motor Sales Co.; capital stock, $10,000; incorporators, M. W. Jennings and others.

Indianapolis, Ind.—Madison Sales Co.; capital stock, $10,000; incorporators, E. L. Baker, C. M. Aldred and H. C. Austill; to deal in motor vehicles.

Kansas City, Mo.—King Motors Co.; capital, $50,000; Douglas Andrews, H. P. Berham and A. H. Robinson. To own, sell and trade generally in motor cars and all kinds of motor vehicles.

Memphis, Tenn.—Allen Motor Car Co.; capital stock, $5,000; incorporators, L. S. Caro, Jesse Edgington, H. J. Holmes, R. M. Bennett and B. D. Edgington.

Newcastle, Ind.—Newcastle Auto Parts Co.; capital stock, $20,000; incorporators, John E. Burns, P. J. Kennedy, W. M. Sample; to deal in motor car parts.

Omaha, Neb.—Runyan Cushion Wheel Co.; A. L. Runyan, F. C. Burlington, Hermann O. Wulff, D. R. Sowards, E. J. Conrad and John E. Von Dorn; capital, $100,000.

Philadelphia, Pa.—Shockley Motor Co.; capital stock, $1,000,000; Louis Ruggins, E. W. Thompson, R. D. Fulcher; to engage in the manufacture and sale of motors, pumps, engines, boilers and motor cars.

Philadelphia, Pa.—Columbia Motor Supply Co.; Capital, $5,000; Treasurer A. J. Zaytoun.

Pittsburgh, Pa.—American Automobilist Service Assn.; capital, $10,000; incorporators, David S. Lieberman, Benjamin H. Rennick and Joseph Reichman.

Poughkeepsie, Pa.—Aaron DeRoy Motor Car Co.; capital stock, $150,000; incorporators, Abraham S. Isaacs, Aaron DeRoy and Elias Sunstein.

St. Louis, Mo.—Carondelet Motor Car Co.; capital stock, $5,000; incorporators, Frank E. Stevens, R. P. Edginton and J. W. Pruett.

St. Louis, Mo.—Carondelet Motor Car Co.; to do a general automobile business; capital stock, $5,000; incorporators, F. E. Stevens, Richard P. Edgington, J. W. Pruett, D. S. Pruett.

St. Louis, Mo.—Broadway Motor Co., to do a general motor car business; capital stock, $5,000; incorporators, A. M. Zerweck, W. N. Morrison, P. H. Brockman.

St. Louis, Mo.—Broadway Motor Co.; capital $5,000; incorporators, A. Brockmann; to act as agents for motor car manufacturers and the makers of parts and accessories.

Saskatoon, Sask.—Chalmer's Motor Sales Co., Ltd.; capital stock, $20,000.

Thibodaux, La.—Pelican Auto Co.; capital $10,000; Richard J. Barker, Frank L. Barker and Sidney A. Bourg.

Toledo, O.—Chevrolet Motor Co.; capital stock, $250,000; to manufacture motor cars and parts; incorporators, Thomas William Warner, E. S. Janney, G. D. Moore, C. L. Hager and E. H. Witker.

Toronto, Can.—Stern Tire & Tube Co.; to manufacture tires, motor cars, tools, accessories, etc.; capital stock, $1,000,000; incorporators, James L. Ross, Arthur S. Macrae, D. J. MacLean and others.

Vermillion, O.—Dall Motor Parts Co.; capital stock, $35,000; incorporator, F. P. Penning.